

**SPECIFICATION
for
MANUFACTURERS' TECHNICAL
DATA**

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

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INTRODUCTION

This specification establishes a standard for the presentation of technical data by an aircraft, aircraft accessory or component manufacturer, required for their respective products.

It is the primary intent of this specification:

To clarify the general requirements of the airline industry, with reference to technical data, its coverage and preparation.

To provide an airline with the necessary data for use throughout its system in the operation, maintenance and overhaul of equipment.

To permit its maximum usage by an airline, without the loss in money and effort now expended in re-writing almost all data to meet individual airline requirements.

Chapter 1 of this specification establishes policies and standards generally applicable to all publications. Chapter 2 establishes additional policies and standards applicable to specific publications. Other data desired by the individual purchaser shall be specified by that purchaser and shall be separately negotiated with the manufacturer.

Except for overhaul information and detail parts breakdown of vendor's equipment, airframe manufacturers' manuals shall include all data covering the complete aircraft, units and components (such as generators, instruments, radio equipment, etc.) where such equipment is installed on the aircraft at the time of delivery to the operator. The airframe manufacturers' manuals shall also include coverage of power plant and propeller installation data pertinent to that airframe and shall make provision for inclusion of engine and propeller manufacturers' data. (Ref. 2-1-0).

Material supplied by the accessory or component manufacturer shall cover all his equipment in accordance with the pertinent sections of this specification. In addition to unit overhaul manuals required by this specification, manufacturers of customer-furnished equipment shall prepare a document, following the standards of this specification as applicable, which will describe the equipment, tell how to install it, show how to check it for proper operation after installation, and provide procedures and trouble-shooting guides for maintaining it in service. This document shall be supplied to the airframe manufacturer when the equipment is to be installed in the aircraft prior to the time of delivery to the customer; it shall be supplied directly to the airline customer when the equipment is purchased by the airline for installation subsequent to delivery of the aircraft.

This specification has been prepared in the general page numbering and paragraph numbering as specified for the various manuals.

Questions on interpretation and proposed changes to this specification should be submitted in writing to the Air Transport Association of America. Such changes, when approved, shall be published by revision to the specification.



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Physical Requirements

POLICY

The following rules shall serve as guides for format, style and method of presentation for all material included in manufacturers' publications. These requirements shall be observed throughout all publications except where modified by provisions of a detail specification.

These rules are written in general terms by intention, and in most cases conform to recognized practices in the industry. In the event there is a question which is not specifically covered by rule, exercise of common sense shall provide a satisfactory answer.

Each manual prepared by an airframe or engine manufacturer shall contain an Introduction which shall include a brief statement explaining the organization, content and method for using the manual.

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FORMAT

1. Manual Form

All publications shall be prepared in loose-leaf form, except as stated below. Airframe manufacturers' publications, engine manufacturers' Overhaul Manuals and Parts Catalogs must be furnished in a rigid-type binder which carries on the backbone the manufacturer's name, aircraft or engine type designations and the title of the publication.

In addition, the airframe, engine and major system manufacturer shall be prepared to provide, by contractual agreement, these publications in punched card, magnetic tape, microfilm or paper copy suitable for microfilming.

2. Paper and Printing

Paper shall be white in color, with good strength characteristics, and of sufficient weight and substance to eliminate excessive show-through when printed on both sides. In meeting these requirements, consideration shall be given to limiting paper bulk. A form of printing shall be used which results in a black image suitable for reproduction by xerography, photo offset, or microfilming. Copy density shall be uniform throughout the page.

Temporary revisions, except microfilm copy, shall be printed on yellow stock. Weight and substance may be governed by printing process used.

Material supplied by the manufacturer for microfilming, including temporary revisions, shall be provided on one side only using smooth finish 20# (pound) opaque white bond paper.

3. Page Layout (Ref. Figs. 1, 2, and 3 of this section)

A. Size

Standard - 8 $\frac{1}{2}$ " x 11"
Oversize - 11" x 16"

B. Binding

All pages, except those prepared for microfilming, shall be set up for standard 3-hole loose-leaf filing. Hole size - 3/8" with center of hole 7/16" from the binding edge. Those prepared for microfilming shall not be punched.

C. Margin Limitations

1-1/8" clear on binding edge; 5/8" clear on outside edge; 1" clear at top and 1-1/4" clear at bottom.

NOTE: If called out in the detail specification, any of these marginal limitations may be altered except the 1-1/8" binding edge.

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A 2" x 3/4" clear space in the upper outside corner shall be left open to permit individual airline pagination. This space may be a part of the top margin.

A 3/8" clear space shall be left between the top of the masthead and the top edge of the page to allow for printing machine paper grip.

4. Page Numbers and Dates

Each page shall bear a chapter/section/subject, page number and date which shall be placed on the lower right hand corner of the page without intruding into the margin (Ref. 1-1-1, Fig. 1 and 2). The chapter/section/subject number shall be shown in characters no less than 0.25" in height. Each page shall bear the effective date -- either that of the original issue or, when revised, that of the latest revision (Ref. 1-1-1, paragraph 7). On pages requiring folding, the fold shall be such that the page number will be visible (Ref. 1-1-3, Fig. 10).

5. Copy Standards

All texts shall be prepared in single column without justified right-hand margins. Right-hand margin justification may be used only if the use of existing printing equipment requires it and results in printing at lower costs. Except for wiring diagrams, fold-outs and pages prepared for microfilming, all pages shall be printed on both sides. When an illustration is reproduced horizontally on a page, the top of the illustration shall always be toward the left edge of the sheet (Ref. 1-1-3, Fig. 4). The manufacturer's masthead and publication title shall appear on all pages which contain text or illustrations.

6. Type Size

All text shall be prepared in 12 pitch elite, 10 pitch pica type or equivalent typewriter size letters and figures, with pica being preferred for copy prepared for microfilming. This specification is printed in elite size and style of type.

Illustration callouts and wiring diagrams may be printed with type so dimensioned that final size on the printed page will not be less than .060 inches in height. A style of letters and numbers without serifs shall be used when mechanical lettering is employed.

7. Identifying Revised Material

A revision to a page is defined as any change to the printed matter that existed previously.

Revisions, additions and deletions prepared by manual means shall be identified by a vertical black line along the left-hand margin of the page opposite only that portion of the printed matter that was changed. A code letter (R) shall be used in the same relative position opposite each changed line of the printed matter to identify similar changes prepared by automated means.

A black line, or an (R) when using automated means, in the left-hand margin opposite the chapter/section and page number will indicate that the text was unchanged, but the material was relocated to a different page.

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NOTE: In the case of parts listings, an individual code letter (R) on each line shall be used to identify revisions.

8. Microfilm Presentation

Film supplied by the manufacturer shall meet the following requirements:

A. Roll Film Master Negative

- (1) Master negative film shall be produced on silver halide film. Film stock shall be unperforated antihalation safety film manufactured expressly for micro-copying.
- (2) Microform and form layout
 - (a) Width of the film shall be 16 millimeters.
 - (b) Images shall be placed so that the 11" side of the page is perpendicular to the length of the film when filmed at 20:1 or 24:1. When 36:1 reduction is used the longer dimension of the page shall be parallel to the length of the film.
 - (c) The exposed image on the film shall be in the center of the 16mm width of the film.
 - (d) Pages shall be filmed in sequence.
 - (e) The first image on each roll shall be the manual title page, consisting of equipment type identification, subject matter coding and distribution date, in characters readable without enlargement.
 - (f) The second image on each roll shall consist of a quality control target page, comprised of a copy of the NBS 1010 Microcopy Resolution Test Chart positioned with the vertical lines of the chart parallel with the sides of the frame, a 2" square of flat black paper and a 2" square outlining an area of the target page (reference Figure 4). The paper used for the control target page shall be 20# opaque white bond.
 - (g) The last image on each roll of film shall be the same as the second image as described in (2)(f).
 - (h) The first five images at the beginning of each chapter shall consist of the chapter title and number. (Reference Figure 5 for type size and style).
 - (i) Filming shall be accomplished so that a chapter will not be divided between two rolls of film unless a single chapter exceeds the capacity of the cartridge.
 - (j) There shall be three feet of clear film before the first and after the last image filmed on each roll.

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(k) Unless specified by the operator, no indexing of film for retrieval purposes is required.

(3) Reduction Ratio

(a) The reduction ratio shall be 20:1, 24:1, or 36:1 as specified by the operator.

(4) Density and Resolution

(a) The background density of each quality control target image (Ref. Fig. 4) shall be between 1.0 and 1.2 visual diffuse transmission density, except that the background density may exceed 1.2 if the line densities are kept below 0.30 transmission density units.

(b) The quality control target image (Ref. Fig. 4) shall have a resolution of not less than 110 lines per millimeter.

(5) Splicing

(a) No splicing shall be permitted within a chapter.

(b) When splicing is accomplished between chapters, a machine applied polyester tape splice shall be used. A minimum of five (5) frames shall separate each splice from both adjacent image pages.

(6) Corrections

(a) When corrections are required in the process of preparing the master negative, the affected chapter shall be refilmed and spliced into the master film at the appropriate location.

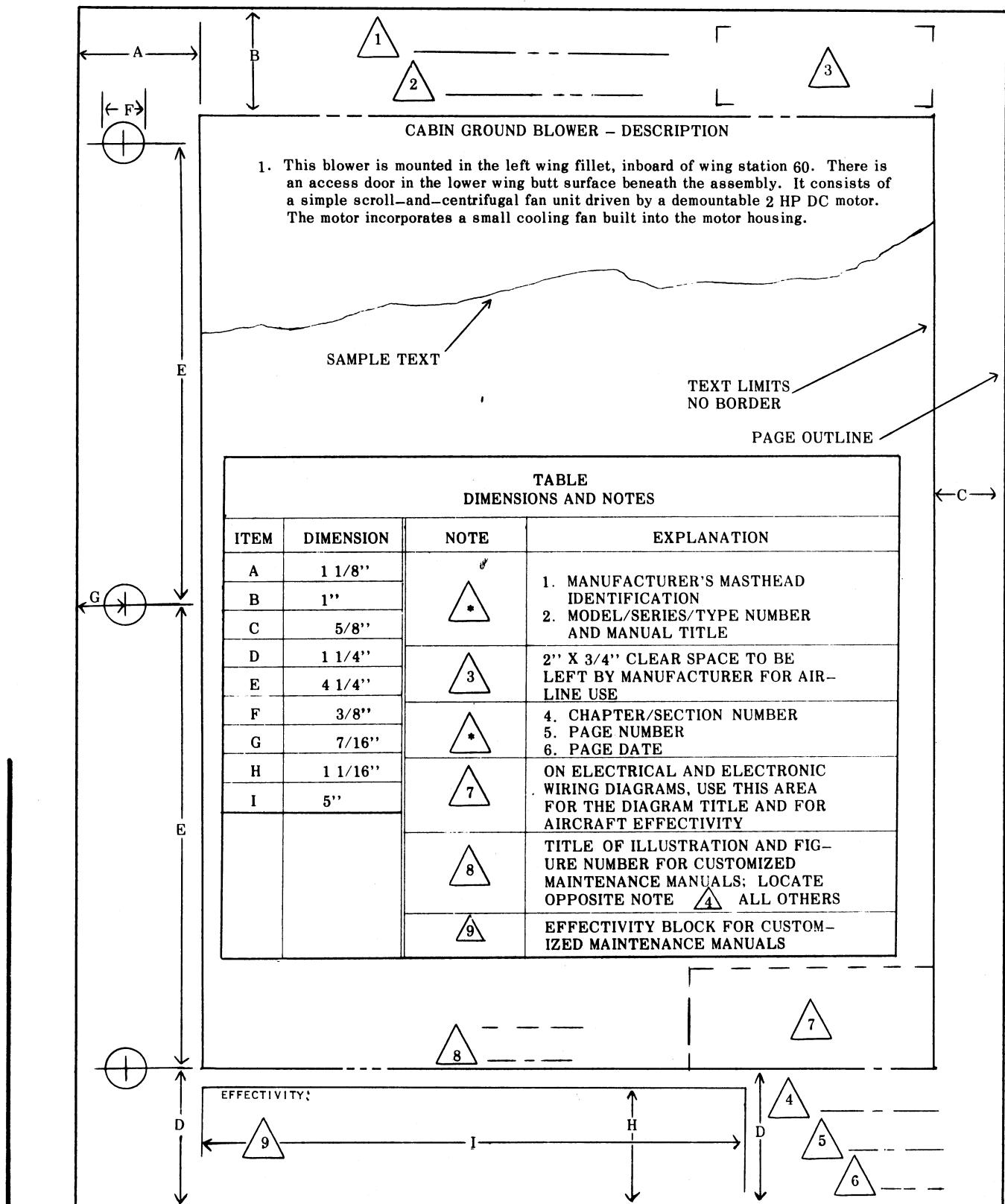
B. Roll Film Duplicate Copies

NOTE: Type of packaging (cartridges, cassettes, etc.) shall be as specified by the operator.

- (1) The quality control target image (Ref. Fig. 4) shall have a resolution of not less than 90 lines per millimeter.
- (2) Background density of the quality control target image (Ref. Fig. 4) shall be within 0.9 to 1.2 visual transmission density, except that the background density may exceed 1.2 if the line densities are kept below 0.30 transmission density units.
- (3) All pages shall appear in negative form (background dark, image light).
- (4) No splices, other than for the leader and trailer, are permitted.
- (5) Cartridges, cassettes, etc., shall be filled as close as practicable to full capacity without splitting chapters.

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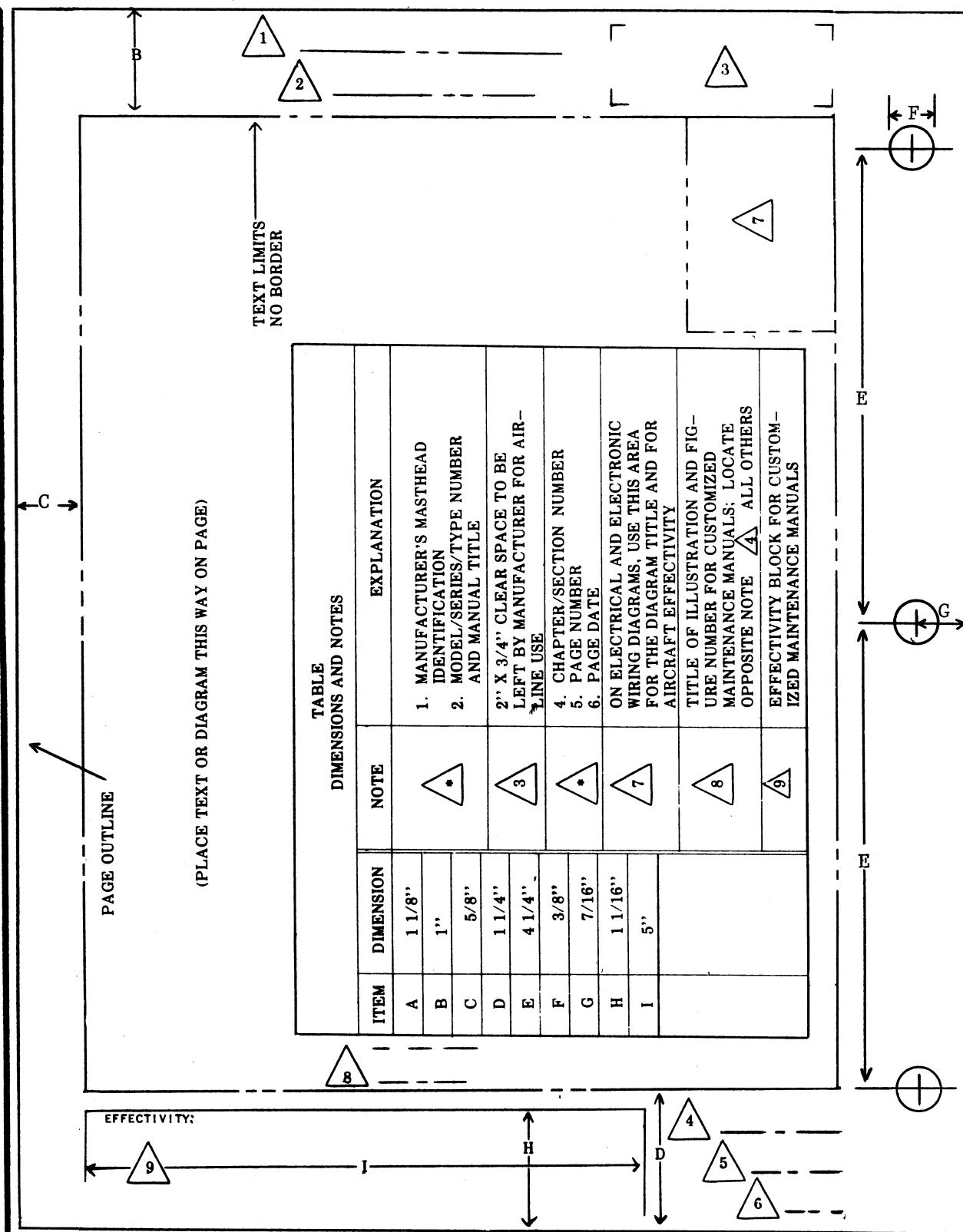
Sample Manual Page - Vertical Layout

Figure 1

- - -

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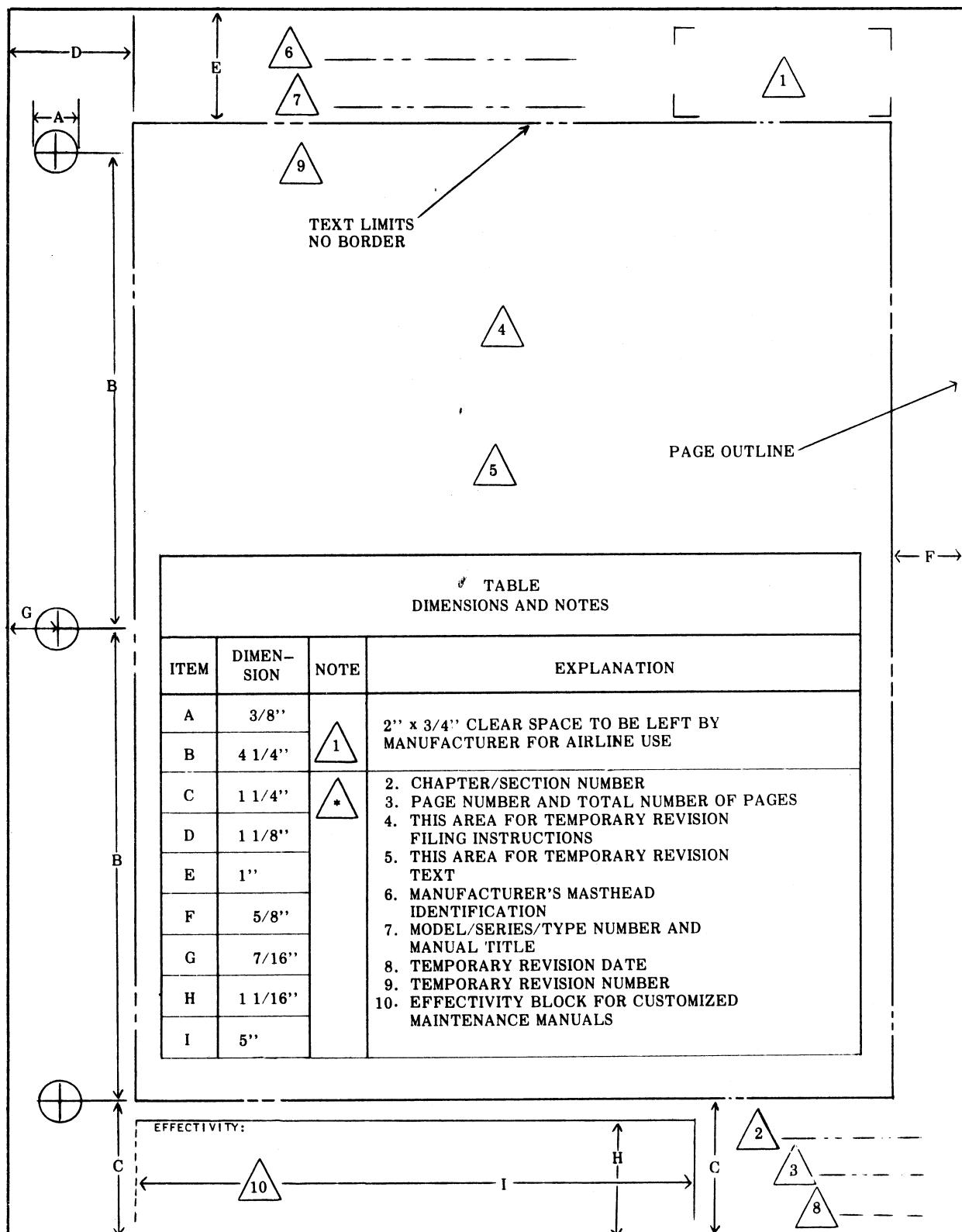
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



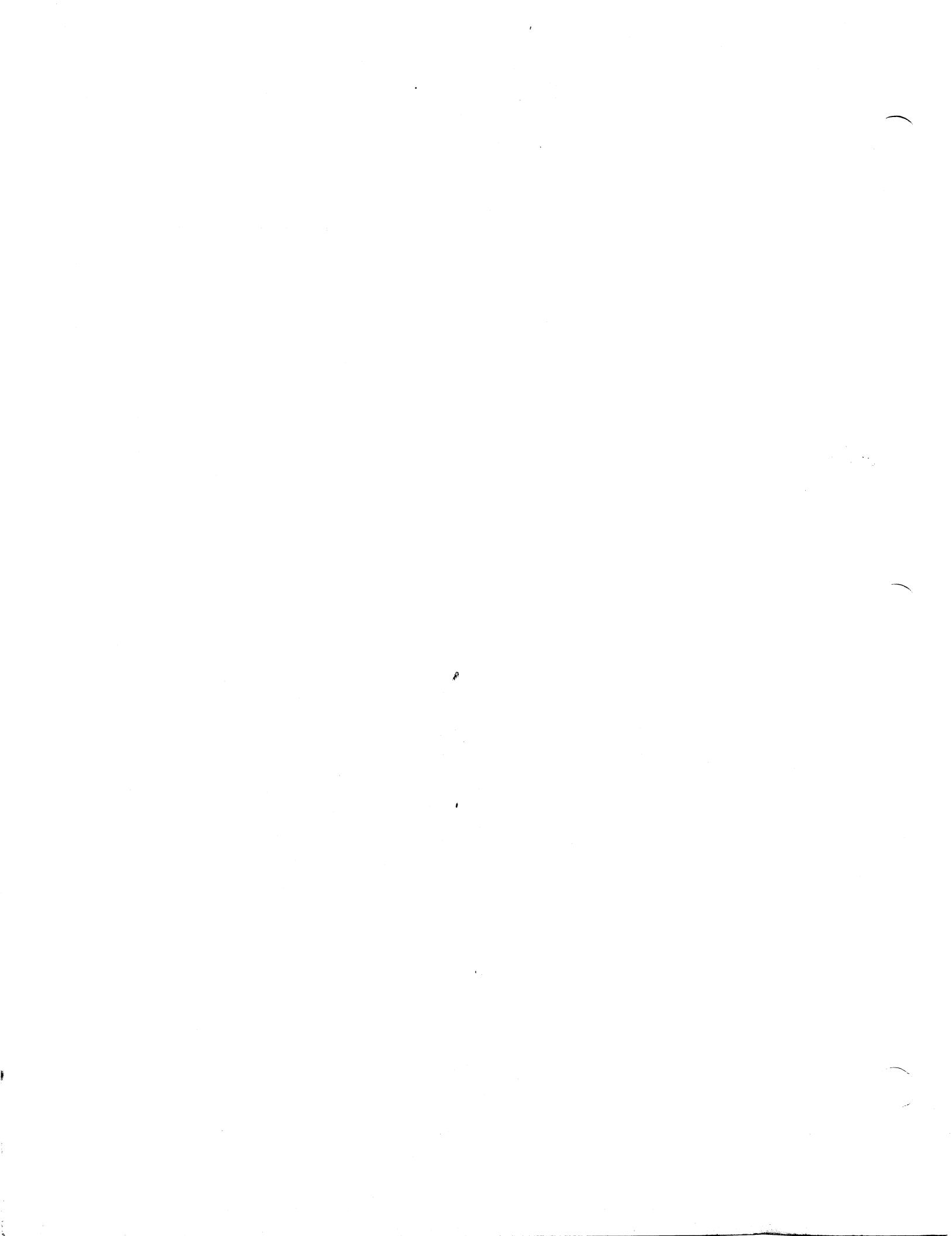
Sample Manual Page - Horizontal Layout
Figure 2

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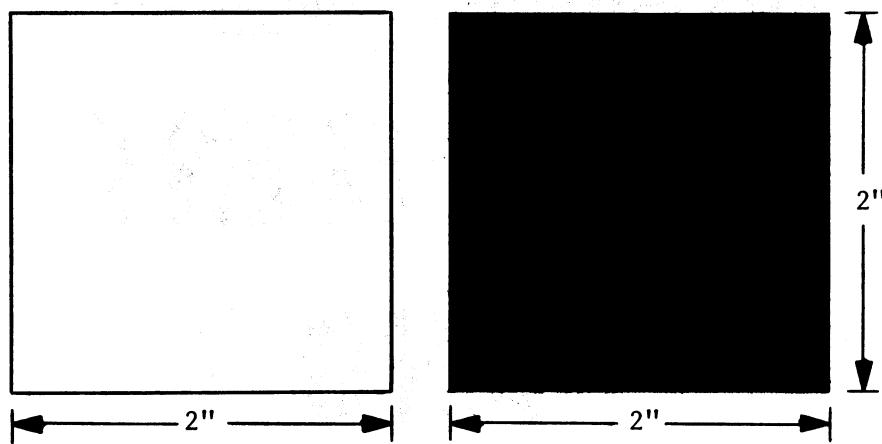
Sample Page - Temporary Revision
Figure 3



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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963



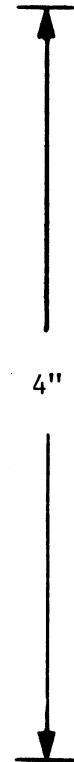
Sample Quality Control Target
Figure 4

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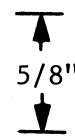
CHAPTER

25



EQUIPMENT

AND



FURNISHINGS

Sample Type Size and Style
Figure 5

| - | - |

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATAINDEXING1. Chapter Listing

Each manual shall carry a list of chapters contained in it.

2. Tab Dividers

Primary divisions or groups (Ref. 1-2-1) of a publication which enable broad separation of content shall be identified by a tab divider carrying the title.

Each chapter, including the Introduction section to the manual, shall be marked with a yellow plasticized tab divider. For ease of reference, these dividers shall be staggered. To the maximum extent possible, the same basic aircraft group and system tabs shall be used in each publication.

3. Table of Contents

Each chapter shall open with a Table of Contents (Ref. Figs. 1, 2 and 3). Table of Contents pages shall bear the applicable chapter number, followed by the word - Contents, and below it the page number and date, beginning with page No. 1. Example for the first page of the Table of Contents for the Auto Flight Chapter:

22 - CONTENTS

Page 1

Date

The contents listing shall contain adequate information to permit the reader to quickly and accurately locate the material he seeks. It shall list in tabular form the title of the chapter, section or subject, as applicable, followed by the element number. The starting page number of each functional breakout (such as Description and Operation, Trouble Shooting and Maintenance Practices) under each title also shall be provided. When a coding system is used to provide customer effectiveness, it shall be listed opposite each item. One such coding example is shown in Fig. 1.

Grouping of technical data within a Chapter shall follow a sub-sub-system concept. A sub-sub-system is defined as a combination of inter-related components arranged to do a specific function (Ref. Fig. 1). Chapters where content does not lend itself to a sub-sub-system grouping shall be grouped by subjects inter-related by area or some common purpose. For example, grouping in the Placards Chapter shall include Interior, Fuselage-Tail, Landing Gear, Decorative Exterior Markings, etc. Another example of such a grouping is in the Electrical Power Chapter of the Illustrated Parts Catalog in which Conduit Installations, Disconnect Installations, Equipment Rack Installations, Panel Installations, etc. are grouped together under the 24-00 General sub-system heading since these installations are common to many other sub-sub-systems in the chapter.

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Each sub-system grouping in the Maintenance Manual and Illustrated Parts Catalog (i.e. 26-10, 26-20, 26-30, etc.) shall begin on a new page. Each sub-sub-system or grouping of inter-related subjects shall be placed numerically within each sub-system under the applicable chapter heading. Each sub-sub-system or grouping of subjects shall be identified in the Contents and all related subjects shall be grouped under the applicable sub-sub-system or group heading (Ref. Fig. 1). It is recommended that every attempt be made when laying out a new manual requiring sub-sub-system numbering to assign the numbers sequentially in conformance with an alphabetical listing of the subject noun.

In the Airframe and Engine Maintenance Manuals, those functional breakouts related to the total sub-sub-system or group shall be listed immediately following the sub-sub-system or group heading and shall be placed in the order in which they appear in the publication. For example, Description and Operation shall be placed first followed by Trouble Shooting, Servicing, Removal/Installation, etc., as applicable. Individual components of the sub-sub-system shall be identified by placing the noun first, followed by the necessary adjectives, placed in alphabetical order and shall immediately follow the total sub-sub-system functional breakouts. Functional breakouts applicable to the individual components shall be placed under the component heading in the order in which they appear in the publication (i.e. Description and Operation, etc.).

Sequence arrangement and indentation requirements are as follows:

System..... Numeric Arrangement

Sub-system..... Numeric Arrangement

Sub-sub-system..... Numeric Arrangement
Function..... Numeric Arrangement
Component/Unit..... Alphabetic Arrangement
Function..... Numeric Arrangement

Illustrated Parts Catalogs contents shall follow the same format as used in the Maintenance Manual except references to the functional breakouts applicable to maintenance of the total sub-sub-system or individual components discussed in the preceding paragraph are not applicable (Ref. Fig. 2). Figure titles placed in alphabetical order under the applicable sub-sub-system or group heading, shall be used in the contents to identify the illustration and shall be descriptive of the parts depicted. The figure title shall list the noun first followed in order by necessary adjectives, the general location of the illustration as related to the aircraft (i.e. fuselage nose, wing, empennage) and the specific location of the illustration as related to the aircraft (i.e. station number, equipment rack number, junction box, etc.). Those major parts or assemblies which are not identified in the figure title shall be listed in alphabetical order immediately following the figure title. Parts Catalog contents shall include an effectiveness column in which the effectiveness numbers of the airplanes to which the figure applies are listed opposite each figure title.

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When applicable, contents for the Airframe Maintenance, Illustrated Parts Catalog and Wiring Diagram Manuals for each airplane fleet shall contain identical sub-sub-system or group headings within each chapter and sub-system to allow the user to readily locate the technical data he seeks. Sub-sub-systems located under the applicable Chapter sub-system heading in the Maintenance Manual shall also be shown under the same Chapter sub-system heading in the Illustrated Parts Catalog and Wiring Diagram Manual. For example, under the sub-system 26-20, Extinguishing, the same three sub-sub-systems (APU Fire Extinguishing System, Engine Fire Extinguishing System and Portable Fire Extinguishing System) would appear under the same Chapter/sub-system heading in the Maintenance Manual and Illustrated Parts Catalog. Identical sub-sub-system listings would also normally appear in the Wiring Diagram Manual. However, since the Portable Fire Extinguishing System does not include wiring, it is not listed in the Wiring Diagram Manual contents (Ref. Fig. 3).

In the Illustrated Parts Catalog, within each chapter, the General sub-system breakdown shall be used to group those components located in the same area, rack, panel, junction box, etc. that are not common to a single sub-system but rather are related to other sub-systems within the chapter. Components listed under the General sub-system breakdown as described above but related to a specific sub-sub-system shall be listed under the appropriate Chapter/ sub-system/sub-sub-system with a cross reference back to the General sub-system breakdown (Ref. Fig. 2, Sheets 1 and 2). Only those components related to a specific chapter as defined in section 1-2-1 shall be listed under the General sub-system breakdown for a particular chapter.

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MANUFACTURERS MASTHEAD
MAINTENANCE MANUAL

<u>Subject</u>	<u>Chapter</u>	<u>Section</u>	<u>Page</u>	<u>Effectivity</u>
<u>Subject</u>		<u>Subject</u>		
<u>EXTINGUISHING</u>	26-20-00			
AUXILIARY POWER UNIT (APU) FIRE EXTINGUISHER SYSTEM	26-21-00			
Description & Operation			1	- ALL
General				
Bottle				
Line - Discharge				
Switch - Fire				
Switches - Discharge				
Operation		3		
Trouble Shooting		101		- ALL
Adjustment/Test		501		- ALL
BOTTLE	26-21-01			
Unit Servicing		301	CONFIG 1 - 901919	
Unit Servicing		301	CONFIG 2 - 920999	
Removal/Installation		401	- ALL	
DISC, INDICATOR - THERMAL				
RELIEF	26-21-11			
Removal/Installation		401	- ALL	
ENGINE FIRE EXTINGUISHING SYSTEM	26-22-00			
Description & Operation		1		- ALL
General				
Bottle				
Indicators				
Line - Discharge				
Switch - Bottle Selector				
Switches - Discharge				
Switches - Engine Fire				
Valve - Engine Selector Control				
Operation		4		
Trouble Shooting		101	- ALL	
Adjustment/Test		501	- ALL	
BOTTLES	26-22-03			
Maintenance Practices		201	- ALL	
Unit Servicing				
Removal/Installation				
DISC, INDICATOR - DISCHARGE	26-22-06			
Removal/Installation		401	- ALL	
VALVE - ENGINE SELECTOR				
CONTROL	26-22-21			
Removal/Installation		401	CONFIG 1 - 901933	
Removal/Installation		401	CONFIG 2 - 934999	
Adjustment/Test		501	CONFIG 1 - 901933	
Adjustment/Test		501	CONFIG 2 - 934999	

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Sample - Table of Contents, Maintenance Manual
Figure 1

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURERS MASTHEAD

ILLUSTRATED PARTS CATALOG

CHAPTER 26 - FIRE PROTECTION

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>CHAPTER SECTION SUBJECT</u>	<u>FIGURE</u>	<u>EFFECTIVITY</u>
<u>GENERAL</u>	26-00-00		
LIGHTSHIELD INSTL - CAPT & F/O	26-00-00	1	901917
LIGHTSHIELD INSTL - CAPT & F/O	26-00-00	2	918925
LIGHTSHIELD INSTL - CAPT & F/O	26-00-00	3	926999
CONNECTOR - POWER			
HANDLE ASSY - FIRE SHUTOFF			
LIGHT ASSYS - WHEEL WELL FIRE WARNING			
LIGHTS - BOTTLE DISCHARGE			
SWITCH - BELL CUTOUT			
SWITCH - FIRE TEST			
SWITCHES - BOTTLE DISCHARGE			
SWITCHES - BOTTLE SELECTOR			
SWITCHES - ENGINE FIRE SHUTOFF			

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Sample - Table of Contents, Illustrated Parts Catalog
Figure 2 (Sheet 1 of 2)

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MANUFACTURERS MASTHEAD

ILLUSTRATED PARTS CATALOG

<u>SUBJECT</u>	<u>CHAPTER SECTION</u>	<u>SUBJECT</u>	<u>FIGURE</u>	<u>EFFECTIVITY</u>
<u>EXTINGUISHING</u>	26-20-00			
AUXILIARY POWER UNIT (APU) FIRE EXTINGUISHING SYSTEM				
DISC, THERMAL RELIEF INDICATOR - FUSELAGE CENTER SECTION, STA 870 TO 904.50 MAIN GEAR	26-21-01	1		
DOOR TO LH WING FAIRING	26-21-03	1		
NOZZLE INSTL - FUSELAGE CENTER SECTION, KEEL BEAM AREA	26-21-04	1	901913	
NOZZLE				
NUT				
UNION				
PANEL INSTL, GROUND CONTROL - LH WING, STA 215	26-21-04	1	901913	
PANEL INSTL, GROUND CONTROL - LH WING, STA 215	26-21-04	2	914999	
BOTTLE & SQUIB				
BRACKET ASSY - FIRE SHUTOFF SWITCH				
SPRING - CONTROL PANEL				
SWITCH & ACTUATOR - BOTTLE DISCHARGE				
SWITCH ASSY - FIRE SHUTOFF				
PLUMBING INSTL - LH FUSELAGE CENTER SECTION, WHEEL WELL & INBD WING	26-21-02	1		
ADAPTER				
HOSES				
PACKING				
TUBING				
REDUCER				
ENGINE FIRE EXTINGUISHING SYSTEM				
BOTTLE & VALVE INSTL - FUSELAGE TAIL SECTION - STA 1183	26-22-02	1		
ANGLE - SUPPORT				
BOTTLE				
INDICATOR - DISCHARGE				
INDICATOR - THERMAL RELIEF				
TUBING				
VALVE - SHUTOFF				
HANDLE ASSY - FIRE SHUTOFF (SEE 26-00-00 LIGHTSHIELD INSTL)				

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Sample - Table of Contents, Illustrated Parts Catalog
Figure 2 (Sheet 2 of 2)

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURERS MASTHEAD

WIRING DIAGRAM MANUAL

CHAPTER 26 - FIRE PROTECTION

TABLE OF CONTENTS

<u>Subject</u>	<u>Chapter</u>	<u>Section</u>	<u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
<u>GENERAL</u>	26-00	-00			
System - Schematic Diagram	26-00	-00	101		901999
<u>DETECTION</u>	26-10	-00			
AUXILIARY POWER UNIT (APU) FIRE DETECTION SYSTEM					
System - Wiring Diagram	26-11	-00	1		901921
System - Wiring Diagram	26-11	-00	2		922999
ENGINE FIRE DETECTION SYSTEM					
System - Wiring Diagram	26-12	-00	1		901913
System - Wiring Diagram	26-12	-00	2		914999
MAIN CABIN COMPARTMENT SMOKE DETECTION SYSTEM					
System - Wiring Diagram	26-13	-00	1		923999
OVERHEAT DETECTION SYSTEM					
System - Wiring Diagram	26-14	-00	1		901999
M113 Fire & Overheat Detection Box - Wiring Diagram	26-14	-01	1		901999
WHEEL WELL FIRE DETECTION SYSTEM					
System - Wiring Diagram	26-15	-00	1		901913
System - Wiring Diagram	26-15	-00	2		914922
System - Wiring Diagram	26-15	-00	3		923999
<u>EXTINGUISHING</u>	26-20	-00			
AUXILIARY POWER UNIT (APU) FIRE EXTINGUISHING SYSTEM					
System - Wiring Diagram	26-21	-00	1		901921
System - Wiring Diagram	26-21	-00	2		922999
ENGINE FIRE EXTINGUISHING SYSTEM					
System - Wiring Diagram	26-22	-00	1		901999
System - Schematic Diagram	26-22	-00	101		901999
<u>EXPLOSION PROTECTION</u>	26-30	-00			
FUEL TANK PROTECTION SYSTEM					
System - Wiring Diagram	26-31	-00	1		923999

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Sample - Table of Contents, Wiring Diagram Manual
Figure 3

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METHOD OF PRESENTATION

1. Text Material - Style

A. Text Content

Text shall be as brief and concise as practicable. The sentence form shall be simple and direct, avoiding the obvious and the elementary, and omitting discussions of theory except where essential for practical understanding and application. All related data shall be grouped in a logical manner.

B. Paragraphing and Outlining

Material shall be prepared in modified block style as used in this specification. Subdivisions of text shall be identified and each breakdown shall be indented two spaces between characters as follows:

■ 1. Major Breakdown

 A. Major Subdivision

 (1) Steps of Procedure

 (a) Any necessary further breakdown of the steps

C. Person and Voice

The second person imperative shall be used for operational procedures; for example: "Break casing bead loose from wheel flange". Avoid sentences in the passive voice. The third person shall be used for descriptive discussion; for example: "The torsion link assembly transmits torsional loads from the axle to the shock strut".

D. Nomenclature

Nomenclature shall be consistent throughout all technical data provided to the Customer. For example, a part once identified as a "cover" shall not be referred to elsewhere as a "plate".

E. Titles

The lead title of major text subdivisions shall indicate in a brief descriptive phrase the subject to be covered and the function to be performed. Titles for subordinate breakdowns of text shall be second person imperative active voice whenever possible; for example, when specific job functions are covered, such as, "Replace Oil Temperature Thermostat Control", "Check Operation of CO₂ System", etc.

The full name of the unit shall be shown in the lead title of the material. If the full name is susceptible to abbreviation for common usage, the abbreviation shall also be included in parenthesis in the title. Future reference to the unit within the write-up may be by abbreviation.

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F. Outlining Form

Procedural material shall be written in outline form showing the operations required in step-by-step sequence with special attention directed to key points of the job. Figure 1 following is an example of the text material for a typical maintenance manual page in desired form.

G. Warnings, Cautions and Notes

These adjuncts to the text may be used to highlight or emphasize important points when necessary. Warnings call attention to use of materials, processes, methods, procedures or limits which must be followed precisely to avoid injury or death to persons. Cautions call attention to methods and procedures which must be followed to avoid damage to equipment. Notes call attention to methods which make the job easier. Each shall be located directly beneath the text and be in line with the paragraph to which it applies.

All notes shall be in upper and lower case letters and preceded by the word NOTE in caps and underlined. Example:

"NOTE: It is not necessary to relieve pressure."

All cautions and warnings shall be printed in capital letters throughout and be preceded with the word CAUTION or WARNING in caps and underlined. Examples:

"CAUTION: DO NOT OPERATE CONTROLS."

"WARNING: SOLUTION IS EXTREMELY FLAMMABLE."

H. Model or Type Reference

A means shall be provided so that the operator may determine easily and with certainty whether a procedure applies to his type or model of the aircraft. Any reference of this type shall be expressed in definite terms such as model or type designation, serial number range, or by a similar method.

I. Figure Reference

All references to illustrations shall be by figure number. The page number shall not be used. When reference is made to a figure in the same subject only the figure number need be referred to. When reference is made to a figure in another subject, the full chapter/section or chapter/section/subject number shall be shown, such as: "Ref. 27-31-02, Fig. 4."

J. Figures shall be numbered consecutively within the smallest division of material used in each manual. When the page block system of breakdown is used in complex manuals, the figure shall follow the page block breakdown except for the 1101-1200 page block (Overhaul Manual Illustrated Parts Lists) in which case the figures shall be numbered consecutively beginning with Fig. 1. For example in the repair section of the Overhaul

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Manual, 27-31-2, Figs. 401, 402, 403, etc. In the illustrated parts list section of the Overhaul Manual (1101-1200 page block) the figure numbers shall be shown as Fig. 1, 2, 3, etc. Where reference is made to an "illustrated parts list" figure in the text of an overhaul manual, it shall be prefixed by the letters IPL; e.g. IPL, Fig. 1.

K. Standard Practices

Standard industry practices such as procedures for magnafluxing, riveting, plating, terminal swaging or dye penetrant inspection normally shall not be covered. Information of this type need be included only when it incorporates new concepts or is applicable only to the manufacturer's product; even in these cases coverage shall be limited to the new or unique. When manufacturer policy requires inclusion of standard practice material and to prevent duplication, it shall be placed in the appropriate standard practice chapter.

Practices or processes which are new, unique or manufacturer-specified for a particular application shall not be placed in the standard practices chapter but shall be included in the appropriate subject write-up.

2. Illustrations (Ref. Figs. 2 through 10 of this section)

A. Presentation

Illustrations shall be used whenever they will simplify, shorten, or make text easier to understand. They shall be located as close as possible to related portions of the text. To the maximum extent practicable, illustrations shall be presented in vertical layout (Ref. 1-1-1, Fig. 1) for ease of reading and cross reference.

B. Use of Color

The use of color is prohibited. Techniques such as shading, cross-hatching, screening or similar means shall be used instead.

Illustrations in the manual which are identical with colored wall charts or transparencies used in training shall make use of distinctive fineline shading patterns such as arrows, cross-hatching, or similar techniques to delineate the different colors.

C. Acceptable and Unacceptable Types

Acceptable types of illustrations are illustrated and explained in the sample pages following. The line drawing is the most desirable for general use.

Humorous cartoons and sketches may be used judiciously to focus attention on such items as detail operating procedure, trouble shooting and "don'ts".

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All illustrations shall bear a title with a figure number on the line directly below.

Where several drawings or illustrations on adjacent pages are used for the same assembly, the same legend or key numbers shall be applied to the same part.

The manufacturer shall not furnish master copy under any circumstances in the form of brownline prints, photostats or blueprints.

D. Callouts

Arrowheads on lead lines are optional except where dimensions are indicated.

E. Electrical and Electronic Diagrams

To support the description and operation of electrical and electronic systems, the following types of illustrations are specified:

- (1) The Block Diagram (Ref. Fig. 7) shall be used in the descriptive portion of the manuals to simplify complex circuits to a point where non-specialized personnel can obtain an understanding of the function and operation of the system. This type of diagram is valuable in showing the arrangement of system components and current flow through the system. It should be considered a training aid, supplementing the circuit description, without requiring extensive electrical background on the part of the reader or trainee. In general, what happens in a particular system component is pointed out without stating how this is accomplished or what units are used inside the boxes to do it. It is mainly used in Maintenance and Overhaul Manuals and to a lesser degree in other publications.
- (2) The Simplified Schematic Diagram (Ref. Fig. 8) falls in the same category but shall be slightly broader in scope. A simplified circuit shall be presented without regard to unit location in the aircraft, but electrically accurate, to allow a clear presentation of the over-all circuit. This type of diagram is valuable in showing the simplified electrical operation of system components and their interconnections and may be used for training, to allow a more detailed understanding of the operation of the system. It shall be provided in all publications as required.
- (3) The Schematic Diagram (Ref. Fig. 9) facilitates tracing and trouble shooting complex circuits. It shows by means of graphic symbols all the components required to perform system operation. It shall be provided in Wiring Diagram manuals and in other publications where this type of information is required. Specific requirements for the construction of this type diagram are specified in Section 2-2-2 of this specification.

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- (4) The Wiring Diagram (Ref. Fig. 10) shall be an installation drawing showing and identifying the units and conductors that make up the installation. It shall be designed for use as an aid in trouble shooting, servicing, repairing and modifying aircraft installations. As such it shall be provided in Wiring Diagram Manuals and in other publications as required. Complete requirements for construction of wiring diagrams are provided in Section 2-2-2 of this specification.
- (5) The Basic Logic Diagram prepared in accordance with American Standards Association Y32.14 shall be used to depict electronic systems and components which use logic, or two-state devices in their construction. It shall be designed to aid in understanding the function and operation of a circuit without showing the physical construction. In this respect, it performs the same function as the Block Diagrams, described in paragraph (1) above.
- (6) The Detailed Logic Diagram prepared in accordance with American Standards Association Y32.14 shall be used to depict logic circuits to aid in troubleshooting. It contains logic symbols to show signal flow and control functions but also shows non-logic functions, connection points and other additional information to fully depict the circuit. The Detailed Logic Diagram shall be similar in function to the Schematic Diagram, described in paragraph (3) above.

F. Dimensioned Drawings

When dimensioned drawings are used, the indication of tolerancing shall be to American Standards Association Y14.5, ISO DR 1016 or other equivalent national standard.

G. Fluid Power Diagrams

The graphical symbols used for fluid power diagrams shall be to American Standards Association Y32.10, ISO DR 1219 or other equivalent national standard.

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MANUFACTURER'S MASTHEAD

MANUAL TITLE

AUGMENTOR VANE ACTUATOR - MAINTENANCE PRACTICES

1. Removal/Installation Augmentor Vane Actuator

A. Remove Augmentor Vane Actuator.

CAUTION: OBSERVE THE SPACER AND WASHER ASSEMBLY SEQUENCE FOR LATER INSTALLATION:

- (1) Remove both augmentor tube access panels.
- (2) Disconnect the actuator electrical plug and the vane position transmitter electrical plug.
- (3) Remove the stabilizer rod attach bolt at the swinging arm eye bolt.
- (4) Remove the eye bolt which attaches the actuator to the swinging arm.

B. Prepare for Installation.

CAUTION: AUGMENTOR ACTUATOR TRAVEL HAS BEEN PRE-SET IN THE SHOP. ADJUSTMENT OF THE JACKSHAFT OR THE LIMIT SWITCHES SHOULD NOT BE REQUIRED - AND IS NOT PERMITTED: USE CARE WHEN WORKING WITH THE ACTUATOR SO AS NOT TO ROTATE THE ACTUATOR HEAD AND LOSE THE SHOP ADJUSTMENT.

- (1) Remove the augmentor vane transmitter and bracket assembly from the old vane actuator and install the transmitter and bracket assembly on the replacement unit in approximately the same position.

NOTE: There is a right hand and left hand actuator having different part numbers.

- (2) Set the vane position transmitter.

(a) Connect the actuator electrical plug, ground the actuator against the wing structure and operate the augmentor vane control switch in the cockpit to TRAIL. This checks that the actuator is retracted to the trail limit position.

NOTE: De-icing heat switch must be IN or the auxiliary heat control switch must be at ARM.

(b) Connect the position transmitter electrical plug. With inverter power ON and the actuator grounded, move the position transmitter arm clamp on the actuator jackshaft so that the indicator pointed in the cockpit is at TRAIL. Secure the transmitter assembly.

- (3) Check that the actuator limit switch cover has a drain hole properly drilled and located.

EFFECTIVITY: ALL

78-11-02

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Sample Page - Paragraphing & Outlining

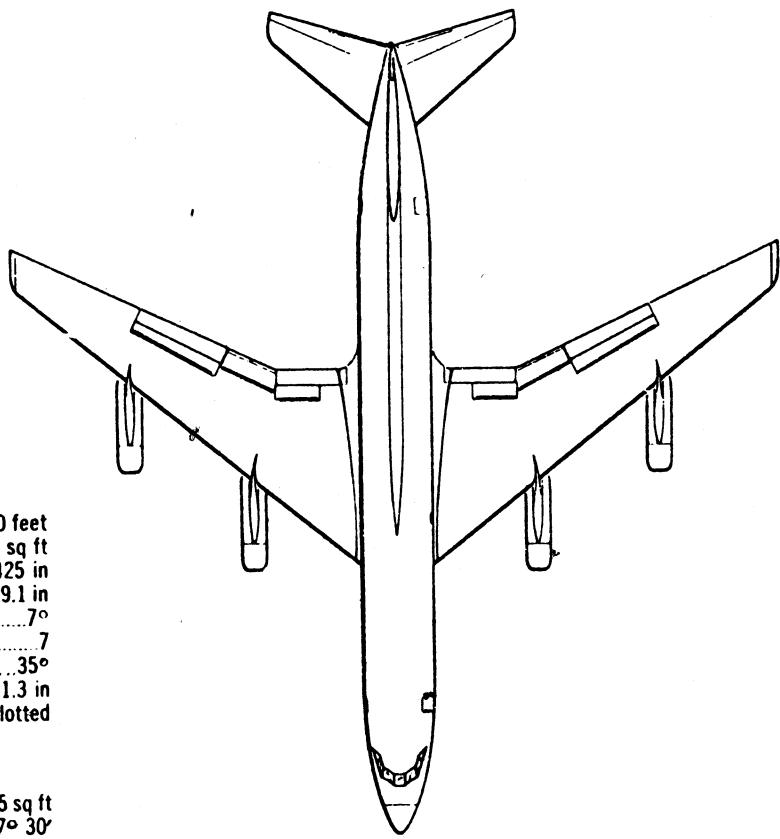
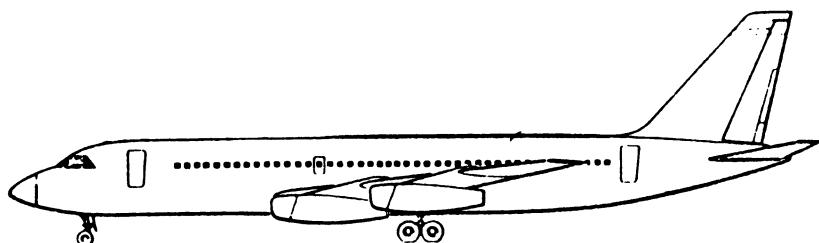
Figure 1

| - | - 3

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Mar 15/68

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



**PRINCIPAL
DIMENSIONS**

WING

Span — Overall	120 feet
Area — Total	2000 sq ft
Root Chord	35 ft 8.425 in
Tip Chord	6 ft 9.1 in
Dihedral	7°
Aspect Ratio	7
Sweepback (30% C)	35°
M.A.C. (true)	18 ft 11.3 in
Flaps — Type	Double-slotted

TAIL

HORIZONTAL

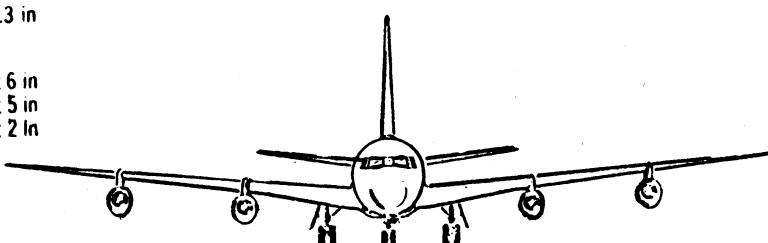
Area	395 sq ft
Dihedral	7° 30'
Sweepback (30% C)	35°

VERTICAL

Area	295 sq ft
Sweepback (30% C)	35°
Top of Fin from Ground	36 ft 0.3 in

FUSELAGE

Width (maximum)	11 ft 6 in
Height (maximum)	12 ft 5 in
Length	124 ft 2 in



This type of drawing is suitable for any outline sketch such as over-all dimensions of an aircraft, station diagrams, towing and taxiing, turn limitations, inspection panel positions, etc.

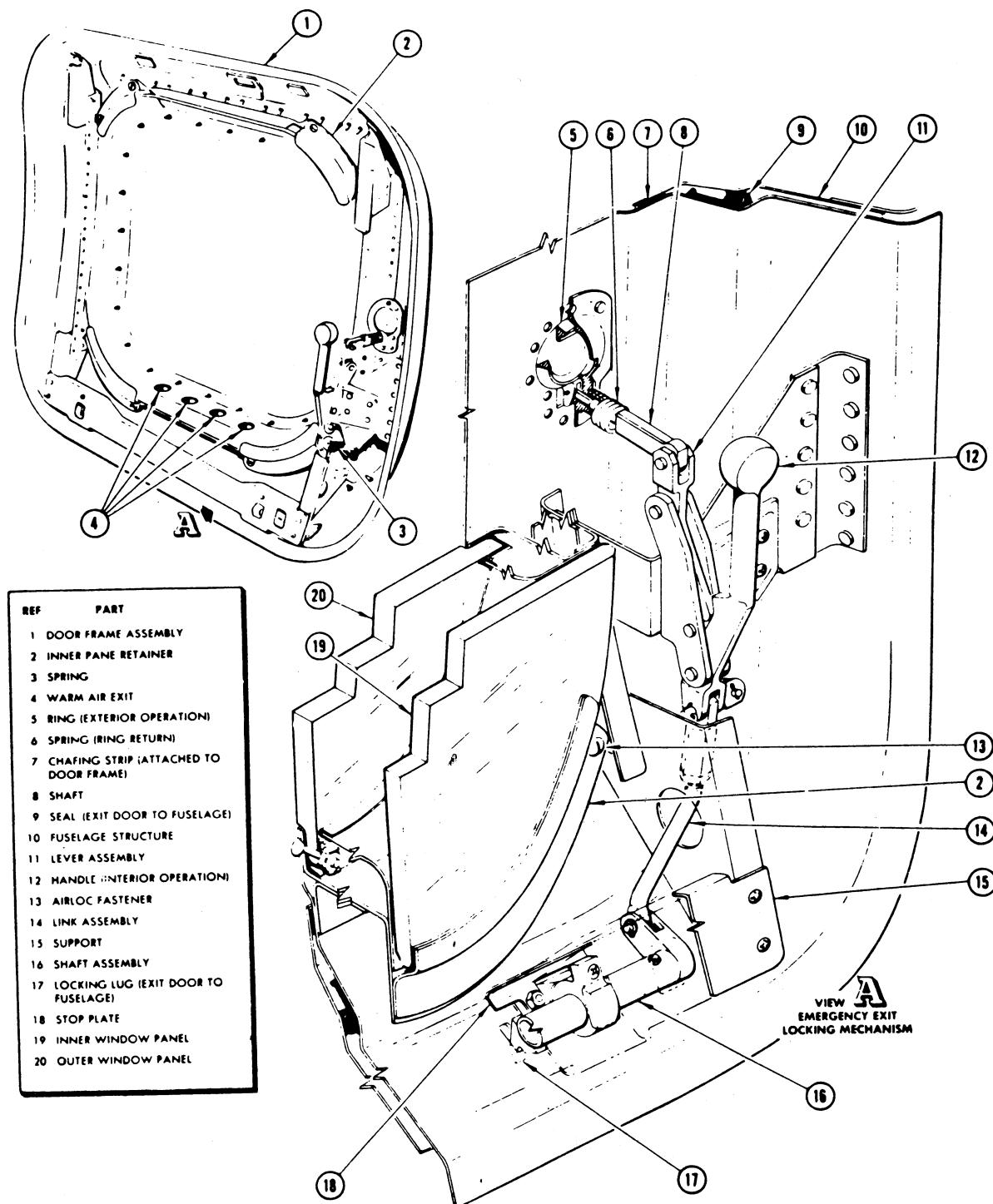
Sample Outline Drawing
Figure 2

1-1-3

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AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



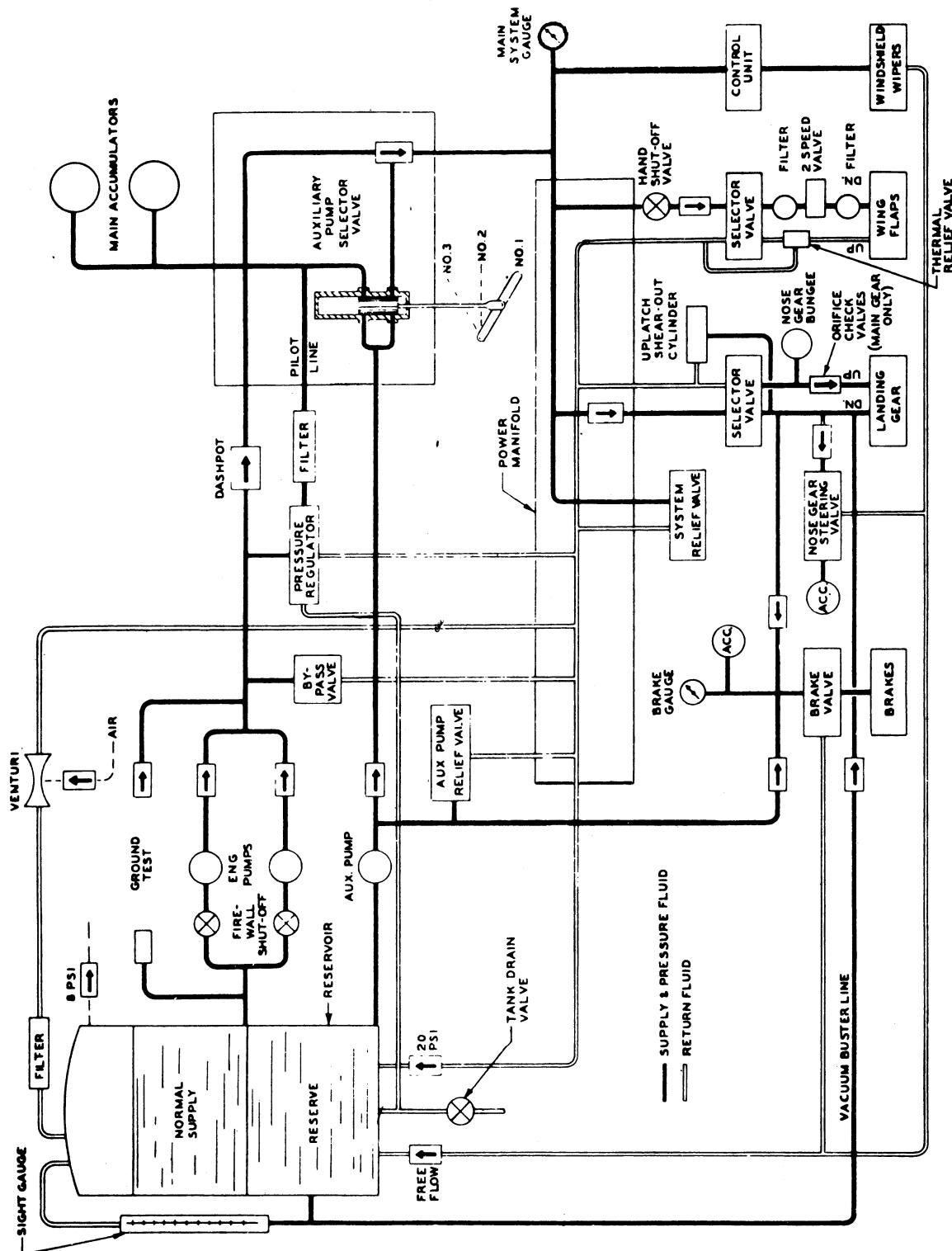
This type of illustration is valuable for detailing and installation. For this reason phantom views should be used extensively in the descriptive matter to portray systems, controls, power plants, internal installations, etc.

| - | - 3

Sample Phantom View
Figure 3

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



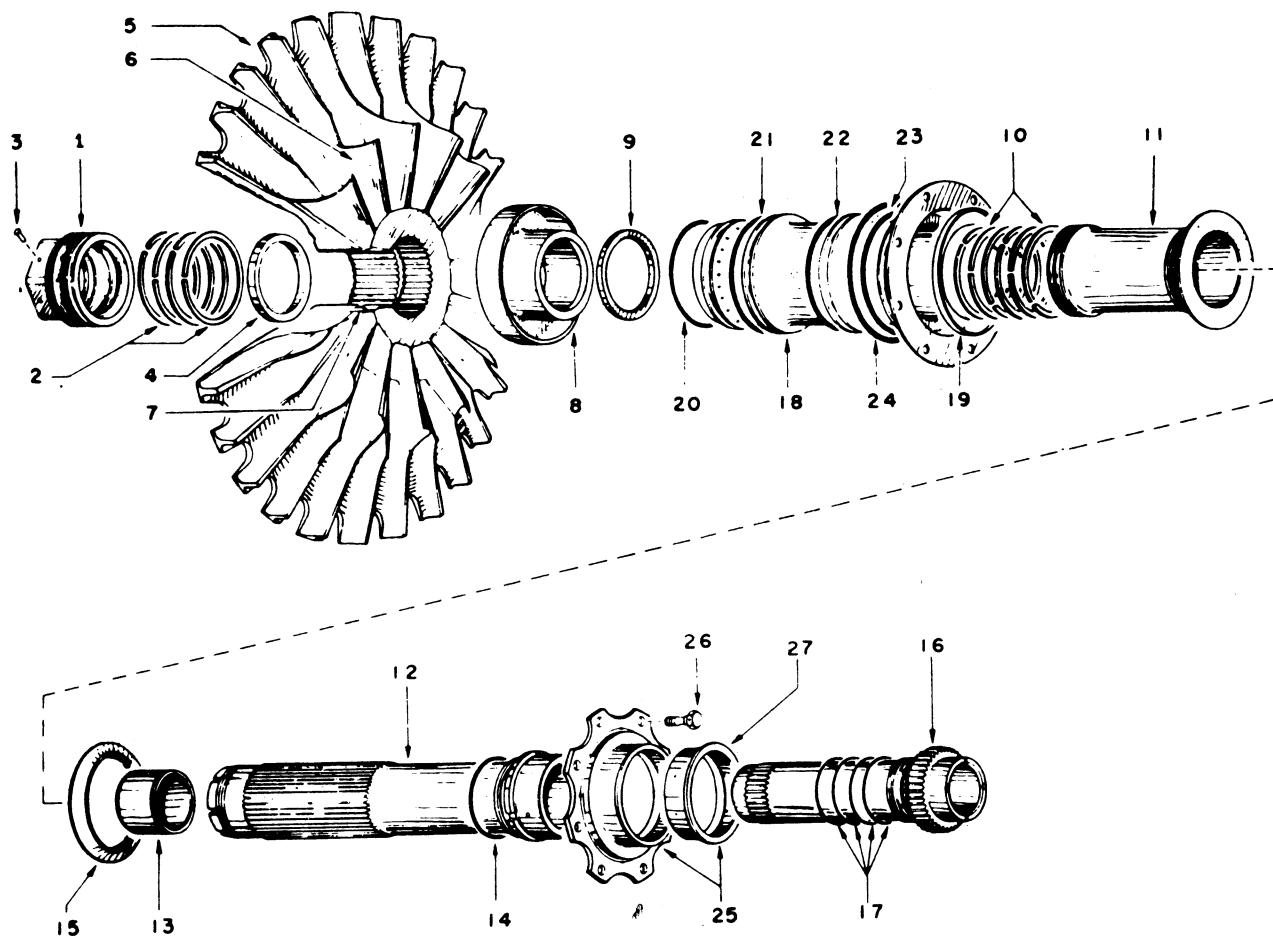
This type of illustration is valuable in detailing operating principles of a particular system. It should be used to support descriptive text.

Sample Schematic
Figure 4

| - | - 3

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



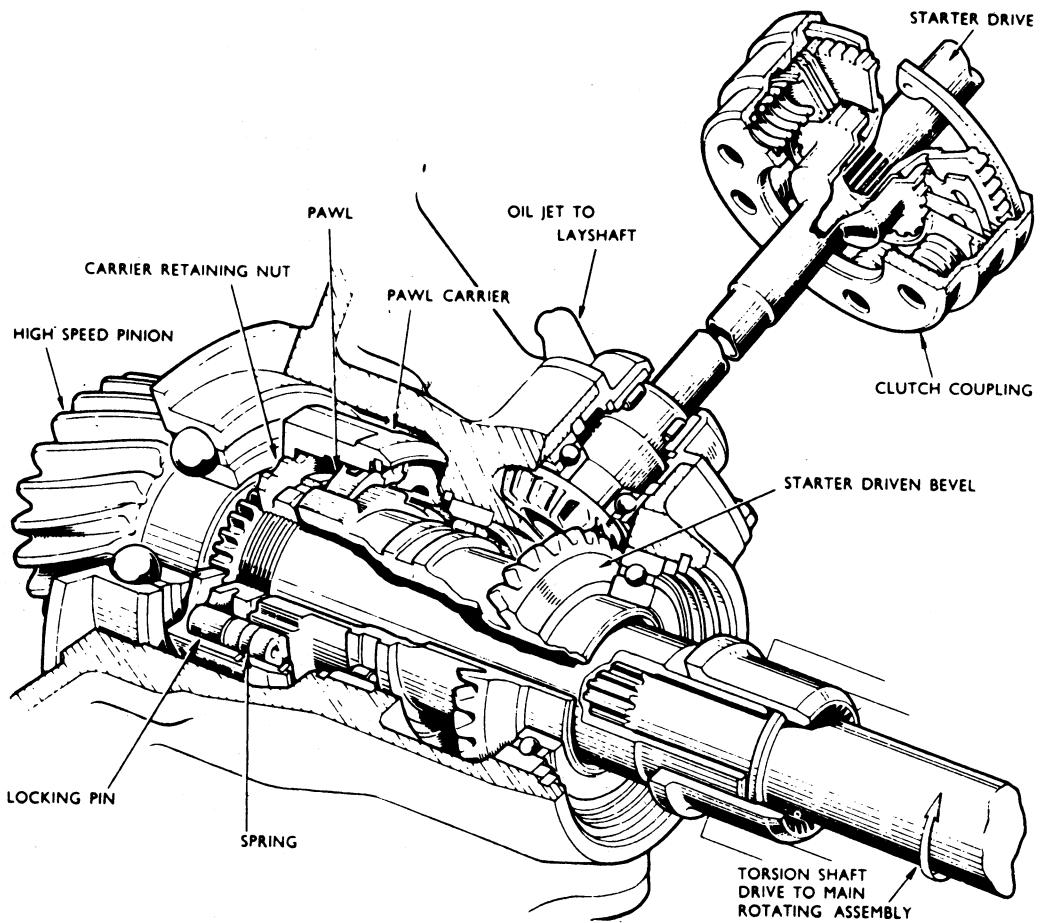
- | | |
|--------------------------------------|---------------------------------------|
| 1. Thrust Nut | 13. Impeller Outer Shaft Bushing |
| 2. Oil Rings | 14. Seal |
| 5. Impeller | 15. Impeller Shaft Rear Oil Seal |
| 6. Inducer | 16. Inner Impeller Shaft |
| 8. Impeller Injection Spinner Spacer | 18. Rear Housing Outer Sleeve |
| 9. Rear Spacer | 19. Rear Sleeve Spacer |
| 10. Metal Oil Rings | 25. Support and Bushing |
| 11. Impeller Shaft Oil Sleeve | 27. Impeller Outer Shaft Rear Bushing |
| 12. Impeller Outer Shaft | |

This type of illustration should be used to support assembly and dismantling instructions, parts lists, aircraft group sections, etc. It should be used throughout the parts lists and wherever detail arrangement is required. Shading is optional.

Sample Exploded View
Figure 5

| - | - 3

AIR TRANSPORT ASSOCIATION OF AMERICA
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



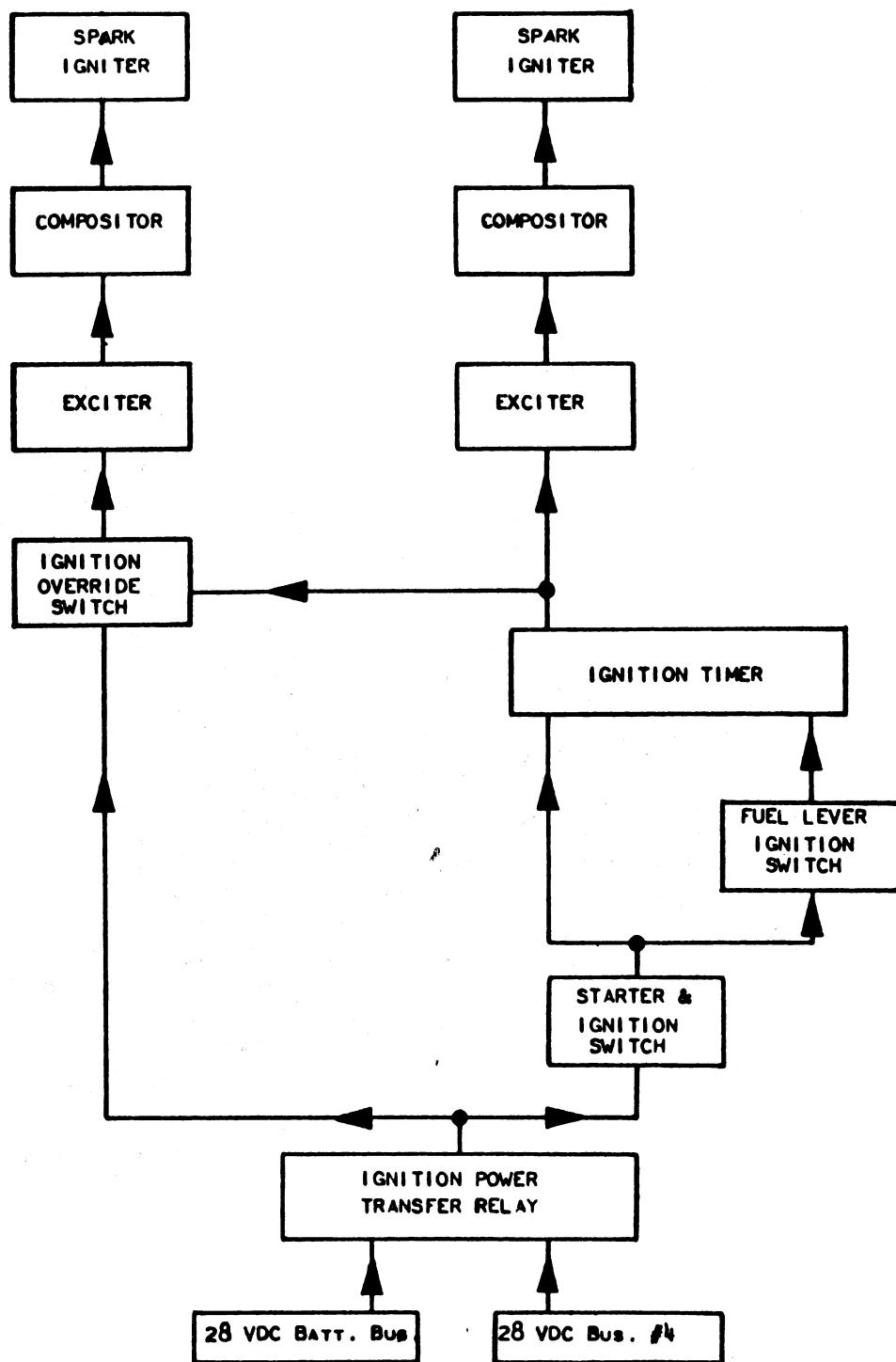
Sample Cut-Away Drawing
Figure 6

| - | - 3

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AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA



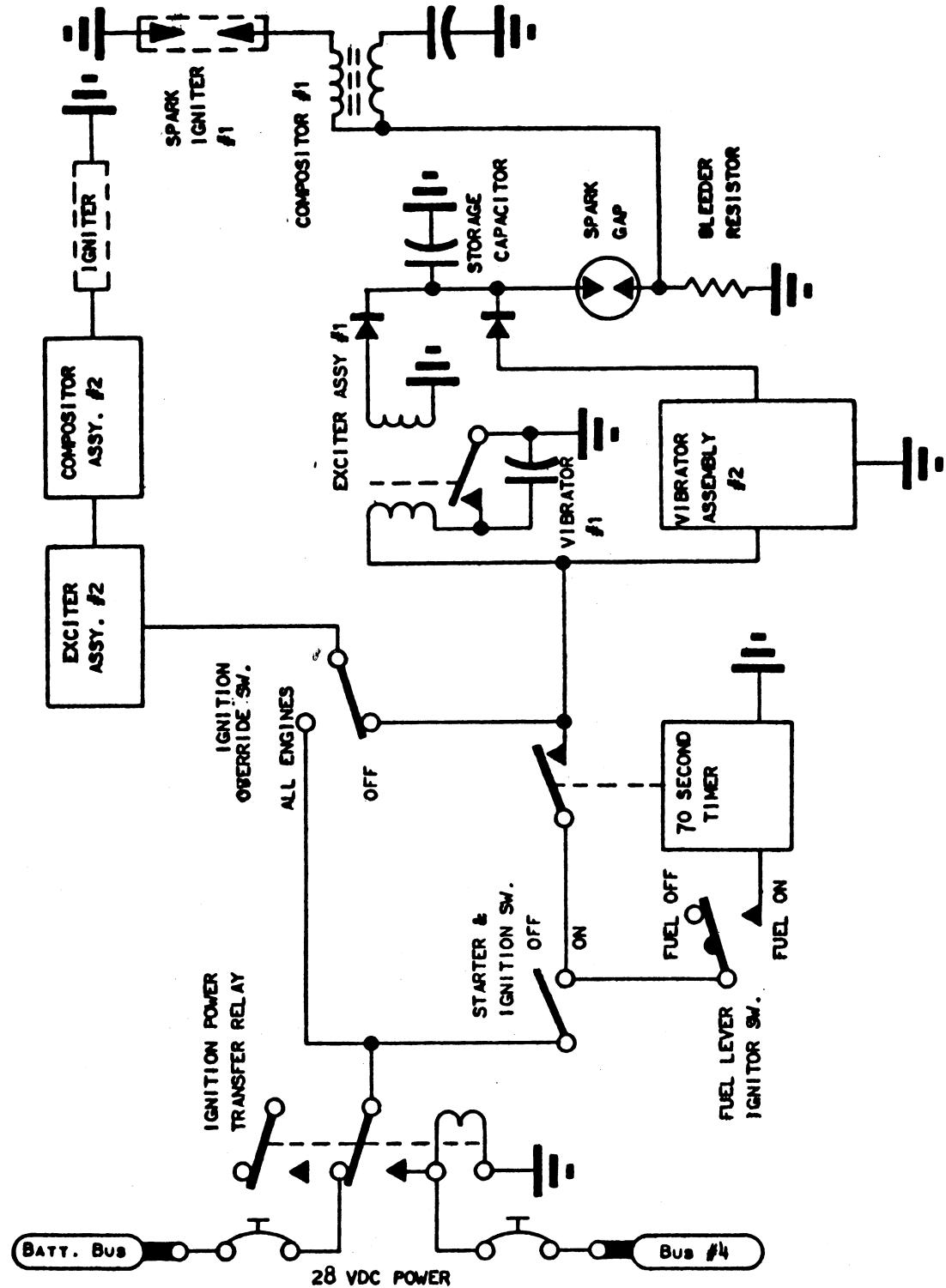
Sample Block Diagram
Figure 7

| - | - 3

Page 12
Aug 1/69

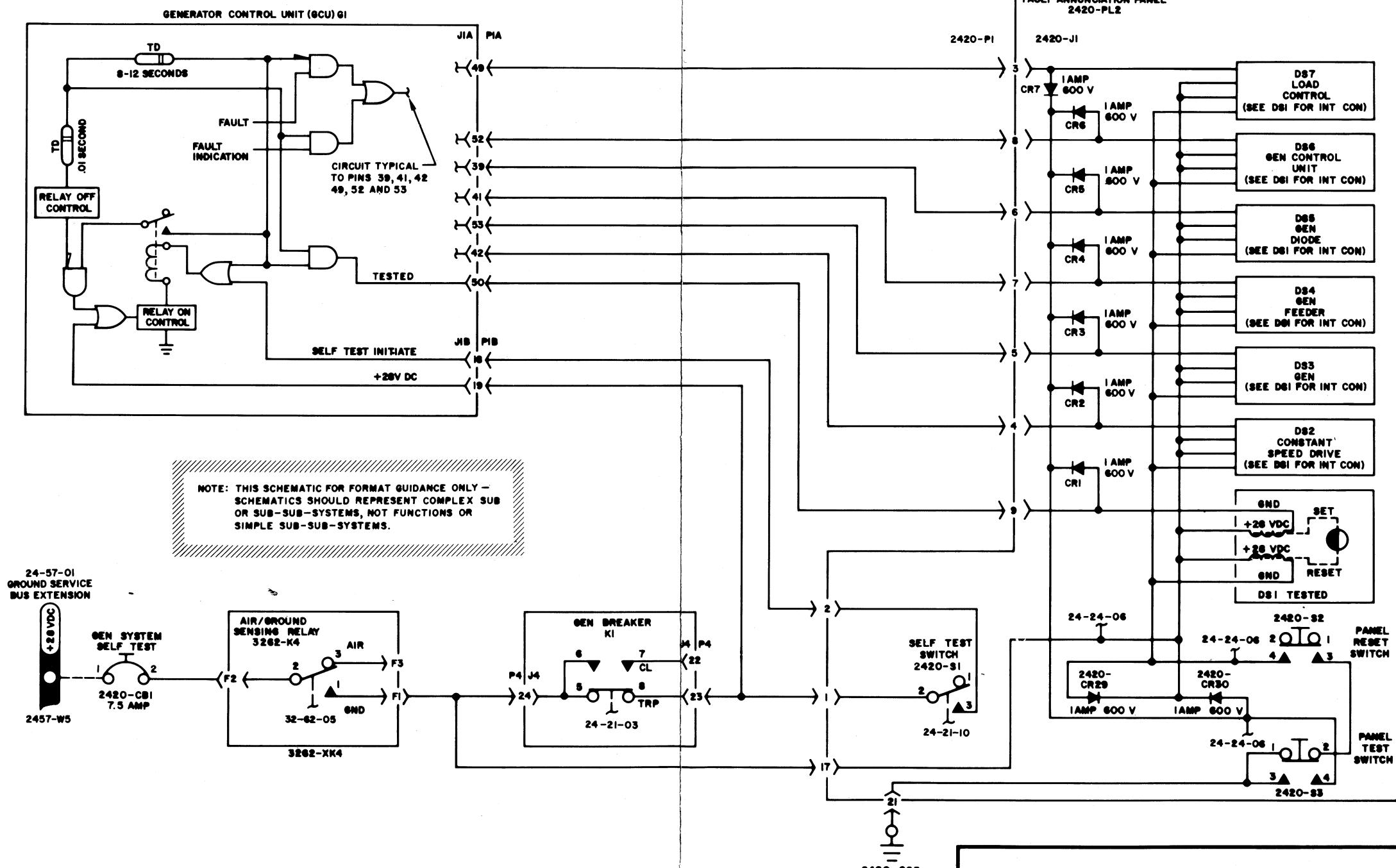
AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

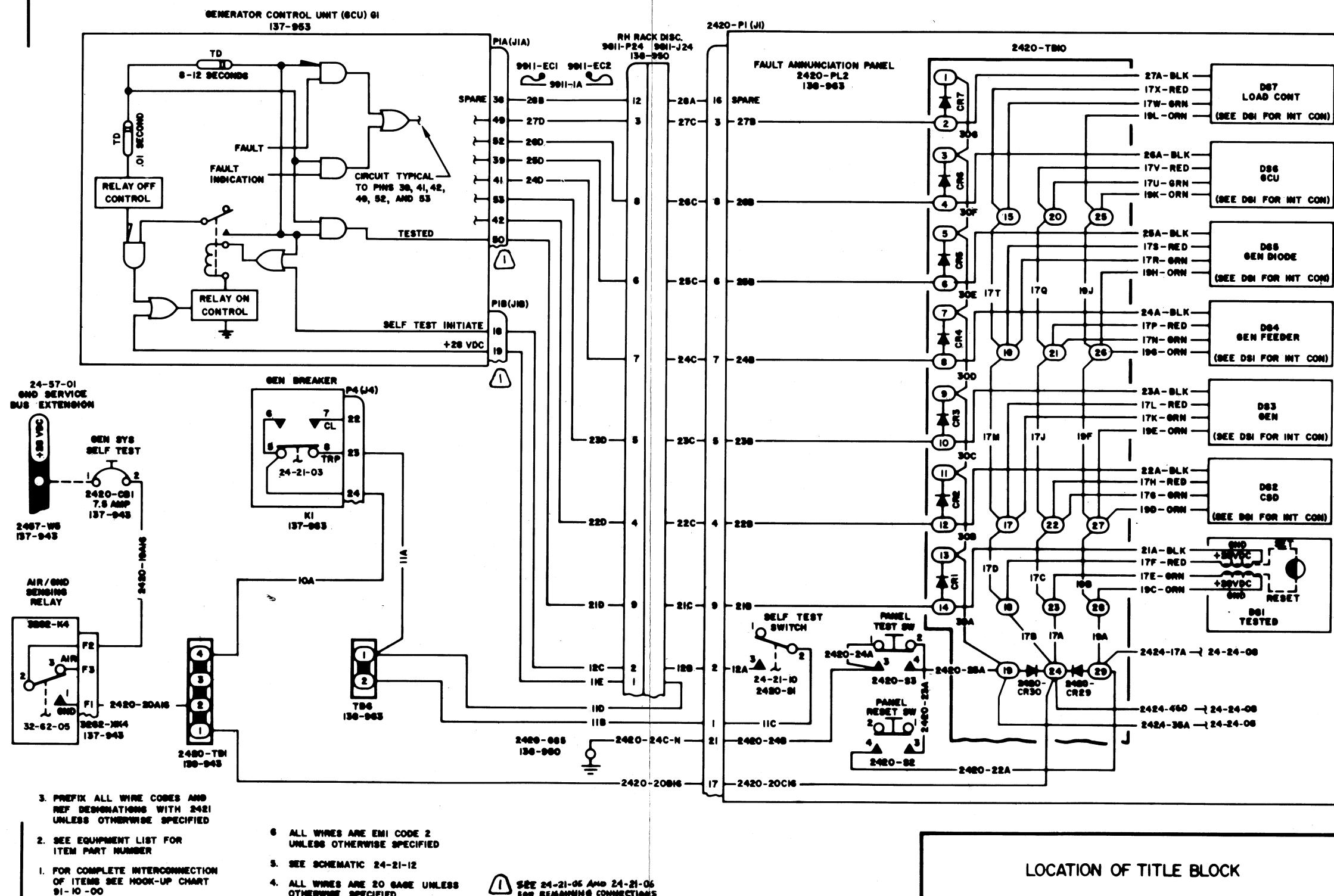


Sample Simplified Schematic
Figure 8







SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

24-21-04

Page 1
Jan 28/70| - | - 3
Page 17
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AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Arrangement of Material

POLICY

In order to standardize the treatment of subject matter and to simplify the user's problem in locating instructions, a uniform method of arranging material in all publications has been developed. It is recognized that the content of certain of the publications does not lend itself to the full breakdown. Where this occurs, the detail specification shall call out authorized deviations.

In general, however, it is desired that the following chapter arrangements and breakdown be followed uniformly and to the maximum extent practicable in all publications.

So as to provide flexibility, frequent breaks have been left in the chapter numbering sequence. Manufacturers may use these unassigned chapters; however, in order to retain consistency of chapter title and content between the various manufacturers, permission to do so must be obtained in advance from the Air Transport Association of America.

1-2-0

Page 1
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AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

ASSIGNMENT OF SUBJECT MATTER

1. Definitions

The contents of a publication shall be organized on four levels, the first three of which shall be selected in accordance with the following assigned Aircraft Group, System and Sub-Systems listing. The levels are defined as follows:

Group	Those primary divisions of a publication which enable broad separation of content. Typical of this division is the separation between Airframe Systems and the aircraft Power Plant.
System/Chapter	Those secondary divisions which permit the subject matter within the Groups to be discussed separately.

NOTE: The Systems are also known as Chapters of a manual. Each chapter is assigned a number and each shall be marked by an index tab divider carrying the System title and Chapter number. The Chapter number is assigned the first element in the standard numbering system (Ref. 1-3-1).

A system is a combination of inter-related components arranged to perform a specific function. Each system as defined includes the basic components and all instruments, mechanical controls, electrical and hydraulic units related to the system.

When a power source (electrical, pneumatic, or hydraulic) services a single component, or serves a single functioning system, that power source will be included in the discussion of the component or system which it serves. Examples are the air storage bottle supplying the air starter, the battery energizing the emergency exit light circuit, the air bottle supplying emergency brake pressure.

When two or more systems are served by a single power source, that power source will be discussed separately under the appropriate chapter heading; either electrical, pneumatic, hydraulic or vacuum. An example is the Pneumatic System supplying air to both the Air Conditioning System and the Engine starters.

Sub-System/
Section Those tertiary divisions which permit a system to be broken into sub-systems.

Sub-Systems/Sections shall be identified by the second element in the standard numbering system (Ref. 1-3-1).

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Unit/Subject

Those final divisions which permit the identification of the individual units in a system or sub-system.

Subjects shall be identified by the third element in the Standard Numbering System (Ref. 1-3-1).

NOTE: Unit/Subject numbers are not pre-assigned; these numbers and their sequence may be selected by the manufacturer to fit the coverage requirements of his publication.

System/Chapter

Sub-System/Section

Unit/Subject

Number

This term describes the complete number when it is referred to as a whole. For example; the number 29-31-03, which contains elements on all levels, may be called the chapter/section/subject number for easier identification and reference.

2. Standard Breakdown

The listing of the following pages identifies and defines the Group, Chapter and Section breakdown which must be followed in all publications. The Section breakdown is assigned to the 00, 10, 20, 30 etc. level.

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

DEFINITIONS OF AIRCRAFT GROUPS, SYSTEMS AND SUB-SYSTEMS

<u>GROUP</u>		<u>DEFINITION</u>	
AIRCRAFT		The complete operational unit. Includes dimensions and areas, lifting and shoring, leveling and weighing, towing and taxiing, parking and mooring, required placards, servicing.	
<u>SYS/ CHAP</u>	<u>SUB-SYS/ SECTION</u>	<u>TITLE</u>	<u>DEFINITION</u>
5		<u>TIME LIMITS/ MAINTENANCE CHECKS</u>	Manufacturers' recommended time limits, maintenance checks and inspections (both scheduled and unscheduled).
	-00	GENERAL	
	-10	TIME LIMITS	Those manufacturer recommended time limits for inspections, maintenance and overhaul of the aircraft, its systems and units, and life of parts.
	-20	SCHEDULED MAINTENANCE CHECKS	Those manufacturer recommended maintenance checks and inspections of the aircraft, its systems and units dictated by the time limits specified in -10 above. This section shall list in more detail the items which are outlined on the airline job forms (usually by title only), and shall cross-reference the detailed procedures included in the individual Maintenance Practices.
	-30 & -40		Reserved for use in those cases where the number of breakouts provided by the fourth digit of the -20 breakout is not sufficient to cover all of the maintenance checks dictated by sub-system -10 above.
<u>NOTE:</u>	Inclusion of the data described in -10 through -40 above, in any manual or manual publication is specifically prohibited unless required by government regulation. Airlines desire the manufacturer's recommended time limits and scheduled maintenance checks but these should be provided in a separate document.		
-50	UNSCHEDULED MAINTENANCE CHECKS		Those maintenance checks and inspections on the aircraft, its systems and units which are dictated by special or unusual conditions which are not related to the time limits specified in -10 above. Includes inspections and

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<u>SYS/ CHAP</u>	<u>SUB-SYS/ SECTION</u>	<u>TITLE</u>	<u>DEFINITION</u>
5	-50 (Continued)		checks such as hard landing, turbulent air, lightning strike, overweight landing, bird strike, slush ingestion, radioactive contamination, maintenance checks prior to engine-out ferry, etc.

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<u>SYS/ CHAP</u>	<u>SUB-SYS/ SECTION</u>	<u>TITLE</u>	<u>DEFINITION</u>
6		<u>DIMENSIONS & CHARTS</u>	Those charts, diagrams, and text which show the area, dimensions, stations, access doors/zoning (Ref. 1-6) and physical locations, of the major structural members of the aircraft. Includes an explanation of the system of zoning and measurement used.

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<u>SYS/ CHAP</u>	<u>SUB-SYS/ SECTION</u>	<u>TITLE</u>	<u>DEFINITION</u>
7		<u>LIFTING & SHORING</u>	That material necessary to describe the lifting and shoring of aircraft in any of the conditions to which it may be subjected. Includes procedures covering maintenance, overhaul and repair as well as abnormal conditions such as belly landing, nose landing, etc. Charts showing lifting and jacking points shall be provided.

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Standard Numbering System

POLICY

In order to provide standardization in the arrangement of all publications, a simple, uniform numbering system has been devised. It has been designed with sufficient flexibility to permit expansion for the more complicated manuals.

It is desired that the basic patterns of both this numbering system and the standard arrangement of material be used throughout all publications. The detail specification for each publication shall establish the level of complexity required.



AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

TYPE OF NUMBERING SYSTEM USED

1. Numbering System

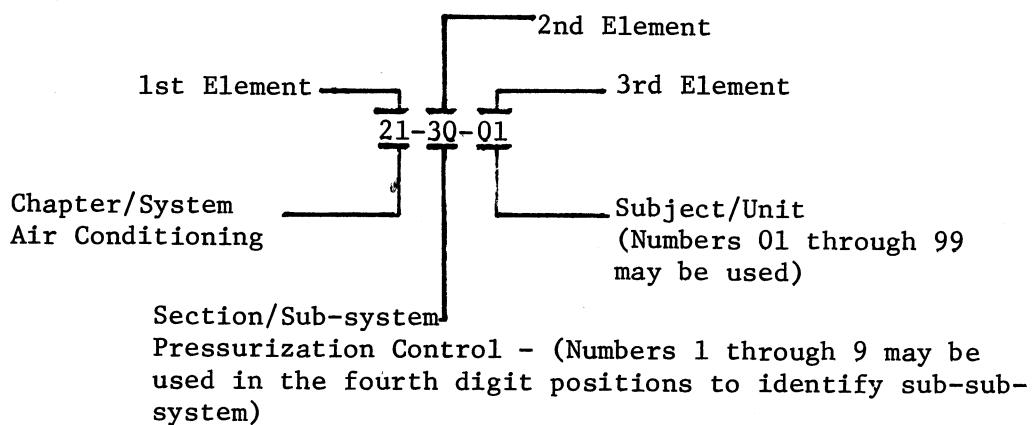
A. General

The numbering system is a conventional dash-number breakdown. It provides a means for dividing material into Chapter, Section, Subject and Page. Broad rules for applying the system follow. Specific instructions applying to individual manuals will be found in the detail specification.

(1) Number Composition

The number is composed of three elements which consist of two digits each.

Example:



NOTE: In covering material which is applicable to a system as a whole, the three element number shall be used. These shall be the Chapter number followed by "-00-00."

Example: 21-00-00 would be used for description and operation, trouble shooting and maintenance practices for the complete Air Conditioning System.

(2) Use of "Chapter/Section" Number Term

When referred to as a unit, and for the sake of brevity, the chapter-section - subject or the chapter-section number, shall be called the "Chapter/Section" number.

The chapter and the broad separations of the section elements are assigned by this specification (Ref. Section 1-2-1). Sub-sub-system breakouts within the section and all unit/subject elements are assigned by the manufacturer.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

(3) Chapter Numbering

Chapter numbers and titles are listed in Section 1-2-1 of this specification. Usage of the chapters in the standard publications is depicted on the charts in Section 1-3-2.

(4) Section/Sub-System Numbering

Section/sub-system numbers and titles are listed in Section 1-2-1. In most chapters the breakdown shown in 1-2-1 with appropriate application of the third element numbers will be adequate to separate the material. However, certain chapters which contain very complex sub-systems may require a further breakout into sub-sub-systems. This will be indicated by the fourth digit such as 34-51-03. In this case -51 might be the DME sub-sub-system of the Dependent Position Determining sub-system of the Navigation system. The -03 might be the Amplifier, a unit of the DME sub-sub-system. Similarly 34-52-01 might be the ADF sub-sub-system and one of its units such as antenna.

NOTE: When complexity of the sub-system dictates need of going to the sub-sub-system breakout the application of the sub-system designator as shown in 1-2-1 must be confined to discussion of the total sub-system, i.e., material contained in 34-50 would necessarily be confined to general discussion of the total dependent position determining sub-system, and would require the addition of zeros in the 3rd element (34-50-00). As a rule a sub-sub-system cannot be identified in the second element unless a fourth digit number is assigned.

(5) Subject/Unit Numbering

The subject/unit number is assigned by the manufacturer.

(6) Page Numbering

Page numbers shall start with page one for each new breakout in a chapter. The pages shall be numbered consecutively thereafter through the entire material written on that subject. Certain additional rules may apply in the more complex publications. (See the detail specifications).

The chapter/section/subject, page number and date shall be placed in the lower right hand corner of the page.

The following example illustrates a typical manual page. Note that chapter, section, subject and page are identified:

31-20-01
Page 1
Date

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

APPLICATION OF UNIFORM CHAPTERIZATION AND NUMBERING SYSTEM
TO STANDARD PUBLICATIONS

The manner in which the Standard Arrangement of Material is applied to each publication and how it provides a means of tying them together is shown in the following Figures.

The contents of each publication must follow this arrangement and sequence.

In publications which do not require text material in every chapter, the unnecessary chapters may be omitted with their tab dividers. An example can be seen in Figure 3, Structural Repair Manual.

Chapters 1 to 4 are unassigned and reserved for airline use. Chapters 13 to 19, 39 to 48, 50, 58, 59, 62 to 64, 66, to 69, and 84 to 90 are unassigned and shall not be used.

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATAREQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

		Manual-General	Tab Divider	List of Eff. Pages	List of Eff. T.R.s.	Contents	Desc. & Operation	Trouble Shooting	Maint. Practices		Tab Divider	List of Eff. Pages	List of Eff. T.R.s.	Contents	Desc. & Operation	Trouble Shooting	Maint. Practices	
Record of Revisions	X										X							
Record of T.R.s.	X																	
Letter of Transmittal	X																	
Service Bulletin List	X																	
Introduction	X X																	
List of Chapters	X																	
AIRCRAFT GENERAL	X																	
5.Time Limits/Mtce.Chks	X X X X X																	
6.Dimensions & Areas	X X X X X																	
7.Lifting & Shoring	X X X X X	X																
8.Levelling & Weighing	X X X X X	X																
9.Towing & Taxiing	X X X X X	X																
10.Parking & Mooring	X X X X X	X																
11.Required Placards	X X X X X																	
12.Servicing	X X X X X	X																
AIRFRAME SYSTEMS	X																	
20.Std. Pract. Airframe	X X X X																	
21.Air Conditioning	X X X X X X X																	
22.Auto Flight	X X X X X X X																	
23.Communications	X X X X X X X																	
24.Electrical Power	X X X X X X X																	
25.Equip/Furnishings	X X X X X X X																	
26.Fire Protection	X X X X X X X																	
27.Flight Controls	X X X X X X X																	
28.Fuel	X X X X X X X																	
29.Hydraulic Power	X X X X X X X																	
30.Ice & Rain Protection	X X X X X X X																	
31.Instruments	X X X X X X X																	
32.Landing Gear	X X X X X X X																	
33.Lights	X X X X X X X																	
34.Navigation	X X X X X X X																	
35.Oxygen	X X X X X X X																	
36.Pneumatic	X X X X X X X																	
37.Vacuum	X X X X X X X																	
38.Water/Waste	X X X X X X X																	
49.Airborne Aux. Power	X X X X X X X																	

MAINTENANCE MANUAL

Figure 1

1-3-2

Page 2
Aug 1/69

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

REQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

		Manual-General	Tab Divider	List of Eff.Pages	List of Eff.T.Rs.	Contents	Wiring Diagrams	Schematics	Tab Divider	List of Eff.Pages	List of Eff.T.Rs.	Contents	Wiring Diagrams	Schematics
Record of Revisions	X													
Record of T.Rs.	X													
Letter of Transmittal	X													
Service Bulletin List	X													
Introduction	X X													
List of Chapters	X													
Equipment List	X X													
AIRCRAFT GENERAL														
5.Time Limits/Mtce.Chks.														
6.Dimensions & Areas														
7.Lifting & Shoring														
8.Levelling & Weighing														
9.Towing & Taxiing														
10.Parking & Mooring														
11.Required Placards														
12.Servicing														
AIRCRAFT SYSTEMS														
20.Std. Pract. Airframe	X X X X													
21.Air Conditioning	X X X X X X													
22.Auto Flight	X X X X X X													
23.Communications	X X X X X X													
24.Electrical Power	X X X X X X													
25.Equipt/Furnishings	X X X X X X													
26.Fire Protection	X X X X X X													
27.Flight Controls	X X X X X X													
28.Fuel	X X X X X X													
29.Hydraulic Power	X X X X X X													
30.Ice & Rain Protection	X X X X X X													
31.Instruments	X X X X X X													
32.Landing Gear	X X X X X X													
33.Lights	X X X X X X													
34.Navigation	X X X X X X													
35.Oxygen	X X X X X X													
36.Pneumatic	X X X X X X													
37.Vacuum	X X X X X X													
38.Water/Waste	X X X X X X													
49.Airborne Aux. Power	X X X X X X													

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATAREQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

Manual-General
Tab Divider

X Tab Divider
Contents
Materials & Subs.
General Repairs
Alignment Checks

STRUCTURE

Record of Revisions	X	51.Structures	X X X X X
Record of T.Rs.	X	52.Doors	X X X X X
Letter of Transmittal	X	53.Fuselage	X X X X X
List of Effective Pages	X	54.Nacelles/Pylons	X X X X X
List of Effective T.Rs.	X	55.Stabilizers	X X X X X
Service Bulletin List	X	56.Windows	X X X X X
Introduction	X X	57.Wings	X X X X X
List of Chapters	X		

AIRCRAFT GENERAL

- 5.Time Limits/Mtce.Chks.
- 6.Dimensions & Areas
- 7.Lifting & Shoring
- 8.Levelling & Weighing
- 9.Towing & Taxiing
- 10.Parking & Mooring
- 11.Required Placards
- 12.Servicing

PROPELLER/ROTOR

- 60.Std. Pract.-Prop/Rotor
- 61.Propellers

65.Rotors

POWER PLANT

- 70.Std. Practices-Engine
- 71.Power Plant
- 72.Engine
- 73.Eng.Fuel & Control
- 74.Ignition
- 75.Air
- 76.Engine Controls
- 77.Engine Indicating
- 78.Exhaust
- 79.Oil
- 80.Starting
- 81.Turbines
- 82.Water Injection
- 83.Accessory Gear Boxes

91.Charts

X X

AIRFRAME SYSTEMS

- 20.Std. Pract. Airframe
- 21.Air Conditioning
- 22.Auto Flight
- 23.Communications
- 24.Electrical Power
- 25.Equipt/Furnishings
- 26.Fire Protection
- 27.Flight Controls
- 28.Fuel
- 29.Hydraulic Power
- 30.Ice & Rain Protection
- 31.Instruments
- 32.Landing Gear
- 33.Lights
- 34.Navigation
- 35.Oxygen
- 36.Pneumatic
- 37.Vacuum
- 38.Water/Waste
- 49.Airborne Aux. Power

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

REQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

		Manual-General Tab Divider List of Eff.Pages Contents Detail.Parts List	STRUCTURE	X Tab Divider List of Eff.Pages Contents Detail.Parts List
Record of Revisions	X			X
Letter of Transmittal	X		51.Structures	X X X X
Service Bulletin List	X		52.Doors	X X X X
Introduction	X X		53.Fuselage	X X X X
List of Chapters	X		54.Nacelles/Pylons	X X X X
Numerical Index	X X		55.Stabilizers	X X X X
AIRCRAFT GENERAL	X		56.Windows	X X X X
			57.Wings	X X X X
5.Time Limits/Mtce.Chks.				
6.Dimensions & Areas.			PROPELLER/ROTOR	X
7.Lifting & Shoring				
8.Levelling & Weighing			60.Std. Pract.-Prop/Rotor	
9.Towing & Taxiing			61.Propellers	X X X X
10.Parking & Mooring				
11.Required Placards	X X X X		65.Rotors	X X X X
12.Servicing				
AIRFRAME SYSTEMS	X		POWER PLANT	X
20.Std. Pract. Airframe				
21.Air Conditioning	X X X X		70.Std.Practices-Engine	
22.Auto Flight	X X X X		71.Power Plant	X X X X
23.Communications	X X X X		72.Engine	X X X X
24.Electrical Power	X X X X		73.Eng.Fuel & Control	X X X X
25.Equipt/Furnishings	X X X X		74.Ignition	X X X X
26.Fire Protection	X X X X		75.Air	X X X X
27.Flight Controls	X X X X		76.Engine Controls	X X X X
28.Fuel	X X X X		77.Engine Indicating	X X X X
29.Hydraulic Power	X X X X		78.Exhaust	X X X X
30.Ice & Rain Protection	X X X X		79.Oil	X X X X
31.Instruments	X X X X		80.Starting	X X X X
32.Landing Gear	X X X X		81.Turbines	X X X X
33.Lights	X X X X		82.Water Injection	X X X X
34.Navigation	X X X X		83.Accessory Gear Boxes	X X X X
35.Oxygen	X X X X			
36.Pneumatic	X X X X		91.Charts	
37.Vacuum	X X X X			
38.Water/Waste	X X X X			
49.Airborne Aux. Power	X X X X			

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

REQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

NOTE: Coverage shall be to UNIT
rather than Aircraft Level.

TEXT CONTENT IN STANDARD PUBLICATIONS	
NOTE: Coverage shall be to UNIT rather than Aircraft Level.	
Record of Revision	X
Record of T.Rs.	X
Letter of Transmittal	X
List of Effective Pages	X
List of Effective T.Rs.	X
Service Bulletin List	X
Introduction	X X
List of Chapters	X
Alpha/Numeric Indexes	X
AIRCRAFT GENERAL	X
5.Time Limits/Mtce.Chks.	X X
AIRFRAME SYSTEMS	X
20.Std. Practices Airframe	X X
21.Air Conditioning	X X X X X X X X X X X X X X X X
22.Auto Flight	X X X X X X X X X X X X X X X X
23.Communications	X X X X X X X X X X X X X X X X
24.Electrical Power	X X X X X X X X X X X X X X X X
25.Equip/Furnishings	X X X X X X X X X X X X X X X X
26.Fire Protection	X X X X X X X X X X X X X X X X
27.Flight Controls	X X X X X X X X X X X X X X X X
28.Fuel	X X X X X X X X X X X X X X X X
29.Hydraulic Power	X X X X X X X X X X X X X X X X
30.Ice & Rain Protection	X X X X X X X X X X X X X X X X
31.Instruments	X X X X X X X X X X X X X X X X
32.Landing Gear	X X X X X X X X X X X X X X X X
33.Lights	X X X X X X X X X X X X X X X X
34.Navigation	X X X X X X X X X X X X X X X X
35.Oxygen	X X X X X X X X X X X X X X X X
36.Pneumatic	X X X X X X X X X X X X X X X X
37.Vacuum	X X X X X X X X X X X X X X X X
38.Water/Waste	X X X X X X X X X X X X X X X X
49.Airborne Aux. Power	X X X X X X X X X X X X X X X X
STRUCTURE	X
51.Structures	X X X X X X X X X X X X X X X X
52.Doors	X X X X X X X X X X X X X X X X
53.Fuselage	X X X X X X X X X X X X X X X X
54.Nacelles/Pylons	X X X X X X X X X X X X X X X X
55.Stabilizers	X X X X X X X X X X X X X X X X
56.Windows	X X X X X X X X X X X X X X X X
57.Wings	X X X X X X X X X X X X X X X X

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REQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

NOTE: Coverage shall be to UNIT
rather than Aircraft level.

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Figure 5 (Sheet 2 of 2)

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REQUIREMENTS FOR TAB DIVIDERS AND
TEXT CONTENT IN STANDARD PUBLICATIONS

NOTE: Coverage shall be by separate bulletin for each subject.

General
Campaign Wire
Alert Service Bull.
Service Bulletin (Std)
Planning Info.
Accomp. Instrs.
Material Info.
Manual Revision

Campaign Wire
Alert Service Bull.
Service Bulletin (Std)
Planning Info.
Accomp. Instrs.
Material Info.
Manual Revision

Numerical Index

X

STRUCTURE

5.Time Limits/Mtce.Chks.	X X X X X X X	51.Structures	X X X X X X X
6.Dimensions & Areas		52.Doors	X X X X X X X
7.Lifting & Shoring	X X X X X X X	53.Fuselage	X X X X X X X
8.Levelling & Weighing	X X X X X X X	54.Nacelles/Pylons	X X X X X X X
9.Towing & Taxiing	X X X X X X X	55.Stabilizers	X X X X X X X
10.Parking & Mooring	X X X X X X X	56.Windows	X X X X X X X
11.Required Placards		57.Wings	X X X X X X X
12.Servicing	X X X X X X X		
		PROPELLER/ROTOR	
		60.Std. Pract.-Prop/Rotor	X X X X X X X
		61.Propellers	
		65.Rotors	X X X X X X X

AIRFRAME SYSTEMS

20.Std. Pract. Airframe	X X X X X X X	POWER PLANT	
21.Air Conditioning	X X X X X X X	70.Std.Practices-Engine	
22.Auto Flight	X X X X X X X	71.Power Plant	X X X X X X X
23.Communications	X X X X X X X	72.Engine	X X X X X X X
24.Electrical Power	X X X X X X X	73.Eng.Fuel & Control	X X X X X X X
25.Equipt/Furnishings	X X X X X X X	74.Ignition	X X X X X X X
26.Fire Protection	X X X X X X X	75.Air	X X X X X X X
27.Flight Controls	X X X X X X X	76.Engine Controls	X X X X X X X
28.Fuel	X X X X X X X	77.Engine Indicating	X X X X X X X
29.Hydraulic Power	X X X X X X X	78.Exhaust	X X X X X X X
30.Ice & Rain Protection	X X X X X X X	79.Oil	X X X X X X X
31.Instruments	X X X X X X X	80.Starting	X X X X X X X
32.Landing Gear	X X X X X X X	81.Turbines	X X X X X X X
33.Lights	X X X X X X X	82.Water Injection	X X X X X X X
34.Navigation	X X X X X X X	83.Accessory Gear Boxes	X X X X X X X
35.Oxygen	X X X X X X X	91.Charts	
36.Pneumatic	X X X X X X X		
37.Vacuum	X X X X X X X		
38.Water/Waste	X X X X X X X		
49.Airborne Aux. Power	X X X X X X X		

SERVICE BULLETIN
Figure 6

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Issuance and Revision Service

POLICY

The manufacturer shall furnish technically accurate publications to the operator in quantity and in conformity with this specification sufficiently in advance of the placing of the aircraft or equipment in service in order that this information will be available to the operator for dissemination to the field and for use in training. In the case of new aircraft or equipment, it is permissible to issue preliminary information. These preliminary publications shall be revised or replaced by final data as soon as possible.

In addition, the manufacturer shall periodically provide an index of all publications prepared by him (except Service Bulletins which shall be separately provided as required by 2-7-3 of this specification), listing the date of issue or the number and date of the latest revision. Format and method of presentation shall be at the discretion of the manufacturer.

Collation or non-collation of the material by the supplier shall be at the discretion of the customer; provided that in the absence of collation instructions from the customer, the supplier shall collate the material in numerical sequence as illustrated by the arrangement of this specification.

A publication once issued shall be kept current by revision service. The practice of reissuing a complete replacement periodically is not acceptable. When a Service Bulletin effects a change to manuals, wiring diagrams, parts catalogs, etc., the manufacturer shall issue the necessary revisions to these publications. The airframe manufacturers shall only take this action upon notification by the operator that he intends to incorporate the Service Bulletin on his aircraft or equipment.

In order that the operator can assure himself which Service Bulletins have been investigated for manual applicability, each manual shall contain a Service Bulletin list. This list shall consist of a numerical list of Service Bulletins with their revision numbers, followed by the date at which manual revision was incorporated, or the words "no effect" to indicate that no change to the manual was necessary for that Service Bulletin issue. The Service Bulletin list shall be revised concurrently with each revision.

Each manual shall have a list of effective pages so that the airline operator may assure himself at any time that the manual is current. A list of effective temporary revision pages, in effect at the time the revision is issued, shall be issued on yellow stock along with the list of effective permanent pages. On the larger manuals, such as the Maintenance Manual, the list of effective pages shall be prepared for each chapter of the manual. In the Engine Overhaul Manual, Chapter 72, the list of effective pages shall be prepared for each page block heading for which a tab divider is provided (Ref. 2-5-1). Additionally, in the larger manuals the chapter listing (Ref. 1-1-2) shall include the latest effective revision number and date for each chapter or page block heading. The list of effective pages shall identify each page individually by chapter/section/subject and page number and shall give the date of each page. Both the list of effective pages and the chapter listing shall be revised concurrently with each revision.

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In order to bridge the gap between revisions to all publications except the Illustrated Parts Catalog and Service Bulletin, and to provide a rapid and convenient means of calling attention to errors or temporary instructions, a temporary revision system is to be provided. The temporary revision shall apply to one subject only and must be keyed in with the manual so that text and revision instructions may be placed adjacent to one another.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

NORMAL REVISION SERVICE

1. Frequency of Revisions

Revisions shall be issued no less frequently than quarterly. Greater frequency is particularly desirable, especially during the introduction of a new fleet into service.

2. Numbering and Dating of Revision Transmittal Sheets

Each revision transmittal after the original issue shall be numbered in consecutive sequence and show date of issue.

3. Transmittal of Revisions

Each copy of each revision shall have a letter of transmittal attached advising all holders of pages (temporary and permanent) to be removed and pages added by the revision. With the exception of the Illustrated Parts Catalog, the transmittal letter also shall include revision Highlight pages which identify the reason for each change. When all, or nearly all the pages of a manual are revised necessitating the issue of a complete replacement, the changed information shall be identified and handled as a normal revision. Special caution shall be exercised not to remove information affecting components still in service but out of production.

4. Record of Revisions

Each manual shall have a Record of Revisions page for entering the successive revision numbers and issue dates, with additional columns for insertion dates and incorporator's initials.

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MANUFACTURER'S MASTHEAD

TO: HOLDERS OF VHF NAVIGATION AND COMMUNICATIONS RECEIVER (P/N)
OVERHAUL MANUAL

REVISION NO. 2 DATED OCT 15/66

HIGHLIGHTS

Pages which have been revised are outlined below together with the highlights of the revision. Please delete the affected pages and enter Revision No. 2 dated Oct 15/66 to the Record of Revision Sheet.

Chapter/Section and Page No.	Description of Change	Effectivity
List of Effective Pages, 1 & 2	Revised to indicate added, revised and/or deleted pages.	All Models
23-20-01 7, 721, 725 726, 727 & 728	Incorporated Service Bulletin No. 23-1. Added description of 500 KC mechanical filter, 500 KC LC Filter Module A5 installed in older units or is standard in newer units as defined by serial number effectivity.	Serial No's. 4257 thru 4281 4931 thru 5059 5790 thru 6041 6107 thru 6131 6133 and up
23-20-01 101, 401 & 501	Incorporated Service Bulletin No. 23-3. Revised Disassembly section to increase scope of r-f and variable i-f module disassembly procedures. Adds Repair Section to include replacement description of l-f and h-f crystals in r-f and variable i-f module. Added procedures on Autopositioner clutch mechanism repair. Revised Assembly Section to increase scope of r-f and variable i-f module assembly and synchronization procedures.	All Models
23-20-01 720 & 733/ 734	Incorporated Service Bulletin No. 23-2. Revised paragraph C to reflect circuit modifications to the i-f and audio module to allow gain of the 500 KC i-f amplifier to be adjusted. Added resistor R37 to control the gain of 500 KC i-f amplifier.	500 KC I-F and Audio Module MCN 7298 and up
23-20 -01 731	Deletes Alternate Method 1 of Adjusting Transient Blanker to eliminate adjustment inaccuracies created by component tolerances.	All Models
23-20-01 706, 707, 710 713/714, 716, 719 & 722	Corrects typographical errors, clarifies meanings, and renames paragraphs required due to addition of material.	All Models

Highlights
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Oct. 15/66

Sample Highlights
Figure 1

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TEMPORARY REVISION SERVICE

1. Numbering and Filing Instructions

Temporary revisions shall be numbered consecutively starting with No. 1 for each chapter. Example: The first temporary revision to the chapter on Communications (23) shall be numbered "TEMPORARY REVISION NO. 23-1." The words "temporary revision" shall not be less than 1/4" in height. (Ref. 1-1-1, Fig. 3, Item 9 for location of this number).

Each temporary revision page shall contain filing instructions which identify the chapter-section-subject and page being revised. Example: "Insert facing page 401, 23-11-02." (Ref. 1-1-1, Fig. 3, Item 4 for location of these instructions.)

Each temporary revision page shall bear the same chapter - section (and subject, if any) number as the publication page being revised. (Ref. 1-1-1, Fig. 3, Item 2 for location of this number.)

Each temporary revision shall start with page number 1 and specify the number of pages which comprise the revision. Example: Page 1 of 6. This page number shall be located in accordance with 1-1-1, Fig. 3, Item 3 and in lieu of the original page number.

Reissued temporary revisions shall contain instructions for the removal of the superseded temporary revision. Example: "This Revision replaces Temporary Revision No. 23-12 which should be removed." (Ref. 1-1-1, Fig. 3, Items 4 and 9 for location of this information.)

2. Temporary Revision Not Subject to Revision

Temporary revisions shall not be revised. If changes are necessary, the revision shall be deleted and re-issued in its entirety.

3. Method of Presentation and Printing

The presentation of the temporary revision shall be headed by a subject title. The temporary revision shall include a narrative type discussion of the reason for issue and the origin reference number where it is applicable; such as, Service Bulletin number, etc. In addition, it shall include a manual-type write-up which can be easily included in the permanent text. Instructions to pen-amend a manual text or illustration are not permitted.

Ditto, mimeograph, offset or any other method of printing temporary revisions is acceptable. The purpose of this system is to permit the manufacturer to cover interim additions or changes rapidly and conveniently.

4. Duration of Temporary Revisions

The content of a temporary revision shall be incorporated into the manual by normal revision or deleted within ninety days from date of issuance. (Exception: In the case of temporary revisions issued by an airframe manufacturer to cover interim fleet configuration differences as a result of an

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operator's planned incorporation of a Service Bulletin, the temporary revision shall remain in effect until the manufacturer has been advised by the operator that fleet incorporation of the Service Bulletin has been completed).

5. Record of Temporary Revisions

Each manual shall have a Record of Temporary Revisions page for entering the successive Temporary Revision numbers and issue dates, with additional columns for insertion dates, removal dates, and incorporator's and remover's initials.

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DEFINITIONS

In order to avoid the confusion arising from varying interpretations of terms, specific definitions have been established for those words which are most generally used.

It is recognized that in normal use, some of these terms are synonymous. However, it is desired that these specific definitions be adhered to, so that the information given cannot be misinterpreted.

- | | |
|------------------------|---|
| PART | - One piece, or two or more pieces joined together which are not normally subject to disassembly without destruction of designed use. |
| SUB-ASSEMBLY | - Two or more parts which form a portion of an assembly or a unit replaceable as a whole, but having a part or parts which are individually replaceable. |
| I ASSEMBLY | - A number of parts or sub-assemblies or any combination thereof joined together to perform a specific function.

<u>NOTE:</u> The distinction between an assembly and a sub-assembly is not always exact - an assembly in one instance may be a sub-assembly in another where it forms a portion of an assembly. |
| UNIT | - An assembly or any combination of parts, sub-assemblies and assemblies mounted together, normally capable of independent operation in a variety of situations.

<u>NOTE:</u> The size of an item is a consideration in some cases. An electric motor for a clock may be considered as a part inasmuch as it is not normally subject to disassembly. |
| ACCESSORY | - A part, sub-assembly or assembly designed for use in conjunction with or to supplement another assembly or a unit. |
| COMPONENT | - Either a part, sub-assembly, assembly and/or unit. |
| INTERCHANGEABLE | - An interchangeable part, sub-assembly, assembly or unit fully meets required functional and structural specifications and has the same overall external dimensions, connections, installation and mounting provisions. Either may be substituted for the other in any and all applications. |
| ALTERNATE | - 1. An alternate part, sub-assembly, assembly or unit fully meets required functional and structural specifications, but differs either in overall external dimensions, connections, installation and/or mounting provisions.

- 2. Alternate procedures fully meet the required maintenance specifications, but may require additional training, special tooling and/or test equipment. |
| SUBSTITUTE | - Use Interchangeable. |

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- CANCEL** - 1. A cancelled part, sub-assembly, assembly or units is one which has been entirely eliminated from all former applications. No requirement exists.
- 2. For technical data use the word "Delete".
- DELETE** - 1. A deleted part, sub-assembly, assembly or unit is one which has been removed from a specific application.
- 2. For technical data, delete indicates the removal of a paragraph, phrase, page, etc.
- SUPERSEDE** - 1. A part, sub-assembly, assembly or unit is superseded when the former has been forced out of use in a specified installation. Old and new are NOT INTERCHANGEABLE.
- 2. A procedure, document or Service Bulletin is superseded when the entire publication is to be removed and discarded, and a revision issued.
- REPLACE** - A part, sub-assembly, assembly or unit is replaced when the former will eventually be forced out of use. Old and new ARE INTERCHANGEABLE.
- MODIFY** - To modify is to alter through rework and/or through the installation or removal of parts, sub-assemblies, assemblies or units.
- OPTIONAL** - Indicates a choice of interchangeable parts, sub-assemblies, assemblies or units.
- EFFECTIVITY** - Indicates a positive application of the use of parts, sub-assemblies, assemblies, units, materials or technical data to a series, model, or type.

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AIRCRAFT ZONING AND ACCESS DOOR AND PANEL IDENTIFICATION

POLICY

In order to standardize the division of aircraft into areas and sub-areas; to simplify the manual users' problems in locating units/components/areas; to facilitate maintenance planning; to simplify preparation of job instructions, and to simplify the identification of access doors and panels: a uniform method of dividing and subdividing the aircraft shall be incorporated. This uniform method of dividing and subdividing shall be called "Zoning."

Each manual in which the zoning concept is used shall contain adequate zoning diagrams, identifying these zones; and access doors and panels.



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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

AIRLINE REQUIREMENTS FOR AIRLINE ZONING

1. Requirements

- A. To facilitate maintenance, planning, preparation of job instructions, location of work areas and components, and a common basis for various maintenance tasks, the following zoning requirements shall be fulfilled:
- (1) The zoning shall be simple and logical in arrangement.
 - (2) The zoning shall be usable by all airlines as a framework for accomplishing maintenance tasks and yet adaptable to data processing techniques.
 - (3) The zoning should be adaptable to current and future aircraft such as the SST.
 - (4) The zoning shall permit individual airlines the flexibility to tailor the system, if necessary, to their own use.
 - (5) The zone shall be identified by a three digit number as the "standard." Additional digits may be used for additional, more detailed breakdown.
 - (6) One digit of the zone number shall indicate, where applicable, left or right zones by the use of an odd digit for left side, even digit for right side. Zones straddling the centerline may be assigned an odd or even zone number.
 - (7) The sequence of zone numbers shall run preferentially from inboard to outboard, front to back in the wing; front to back and away from the floor line in the fuselage, and from root to tip in the vertical stabilizer.
 - (8) Major structural components including entrance doors, cabin service doors, cargo doors, landing gears, landing gear doors, rudders, elevators, flaps, ailerons, slots, slats, and leading edge devices shall have individual zone numbers.
 - (9) Wing leading edges, trailing edges, wheel wells, fuel tanks, accessory compartments, cockpit, and other high manpower work areas shall be suitably zoned to define the work area.
 - (10) The zones, wherever possible, shall be defined by actual physical boundaries such as wing spars, major bulkheads, cabin floor, major partitions, control surface boundaries, skin, etc. Internal boundaries in the wing and fuselage normally are of greater value in establishing zone boundaries than external boundaries such as skin joints.
 - (11) The area enclosed by the wing-to-fuselage fillets shall have individual fuselage zone numbers.

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- (12) The center wing area within the fuselage and area between the wing and the fuselage floor shall have fuselage zone numbers.
- (13) Zone numbers shall be compatible with both passenger and cargo versions of the aircraft. However, for significant differences such as a nose loading door or a large cabin cargo entry door separate new zone numbers shall be assigned.
- (14) Zone charts or diagrams shall clearly designate zone boundaries and their station numbers. A physical description of the zone boundaries shall be included. (See example for zone diagram for zone 100, 500 and 800 included in this section).
- (15) In zoning the fuselage, zone boundaries shall not split galleys, toilets, or major equipment centers.
- (16) Zone boundaries shall enclose related structure such as door jambs. That is, a jamb for a specific door shall not be split by a zone boundary.
- (17) A zone shall be identified by one of the following three manners:
 - (a) Large areas shall be identified by a three digit 100 series number as follows:

	<u>Major Zone No.</u>	<u>Area</u>
Standard Series Numbers	100	Lower half of fuselage to rear pressure bulkhead. (Lower half defined as that area below the main cabin deck).
	200	Upper half of fuselage to rear pressure bulkhead. (Upper half defined as that area above the main cabin deck).
	300	Empennage
	400	Powerplants and struts
	500	Left Wing
	600	Right Wing
	700	Landing Gear and Landing Gear Doors
	800	Doors
Special Series	900	Reserved for uncommon differences between aircraft types not covered by standard series numbers.

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- (b) Division of the 100 series zones is accomplished by sub-zoning on the basis of the second digit in the zone number. As an example, Zone 300 may be subzoned as follows:

<u>Major Sub-Zone No.</u>	<u>Area</u>
310	Fuselage aft of pressure bulkhead
320	Vertical stabilizer and rudder
330	Left horizontal stabilizer and elevator
340	Right horizontal stabilizer and elevator

- (c) Divisions of sub-zones are accomplished by use of the third digit in the zone numbers. As an example, Zone 320 may be divided as follows:

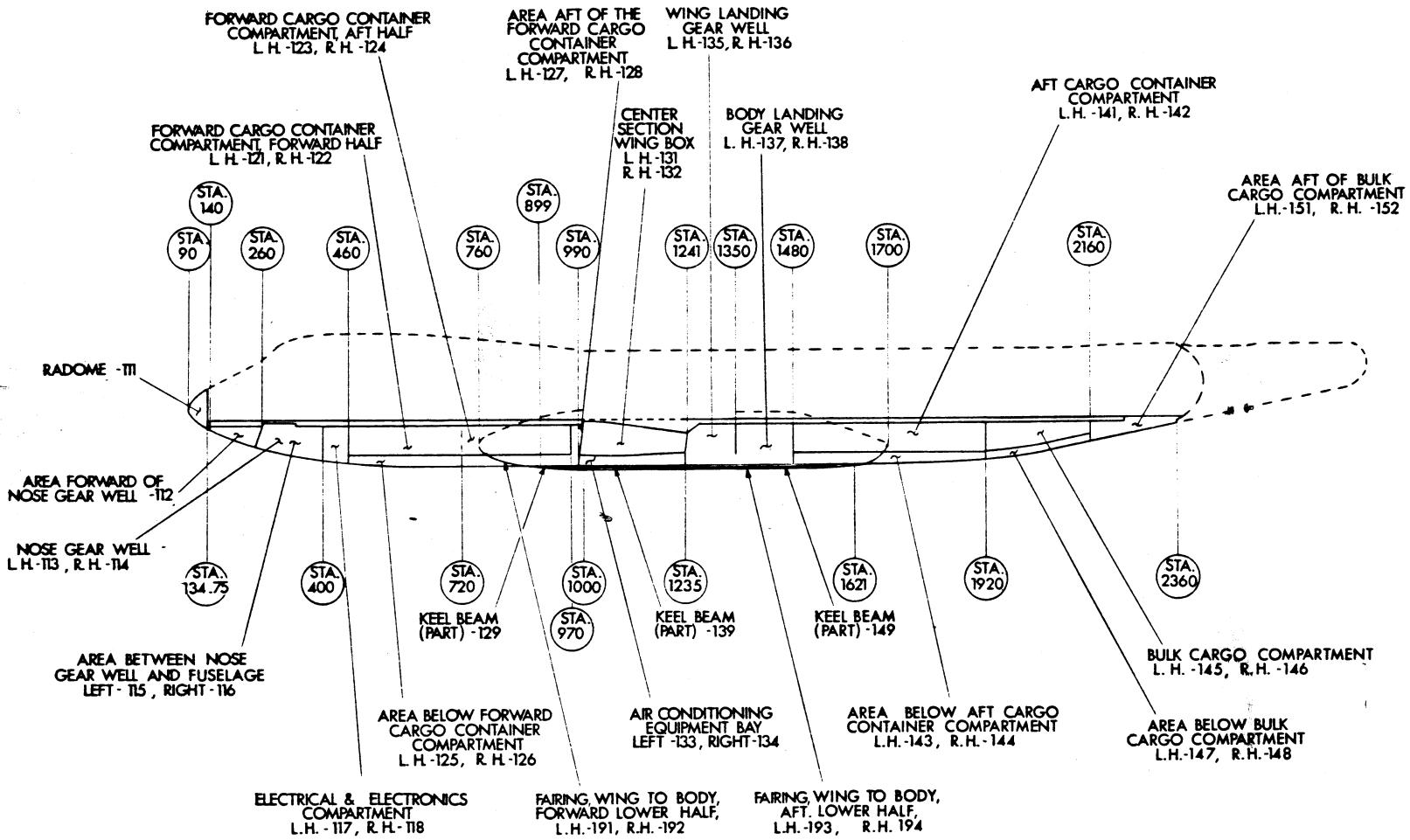
<u>Zone No.</u>	<u>Area</u>
321	Vertical stabilizer leading edge
322	Vertical stabilizer auxiliary spar to front spar
323	Front spar to rear spar
324	Rear spar to trailing edge
325	Lower rudder
326	Upper rudder
327	Vertical stabilizer tip

- (18) The application of the zoning arrangement shall permit defining a work task or inspection area by any one of the three manners of zone identification. For example, an external inspection of the exterior of the empennage may be specified as follows depending upon the area desired to be inspected:

Zone 300. . . . inspect external structure.
(Entire major zone)

Zone 320. . . . inspect external structure.
(Vertical stabilizer and rudder)

Zone 321. . . . inspect external structure.
(Vertical stabilizer leading edge)



Sample - Major Zone 100 Breakdown

Figure 1 (Sheet 1 of 2)

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MAJOR ZONE 100 - LOWER HALF OF FUSELAGE

SUB-MAJOR ZONE 110 - Sta. 90 to Sta. 460

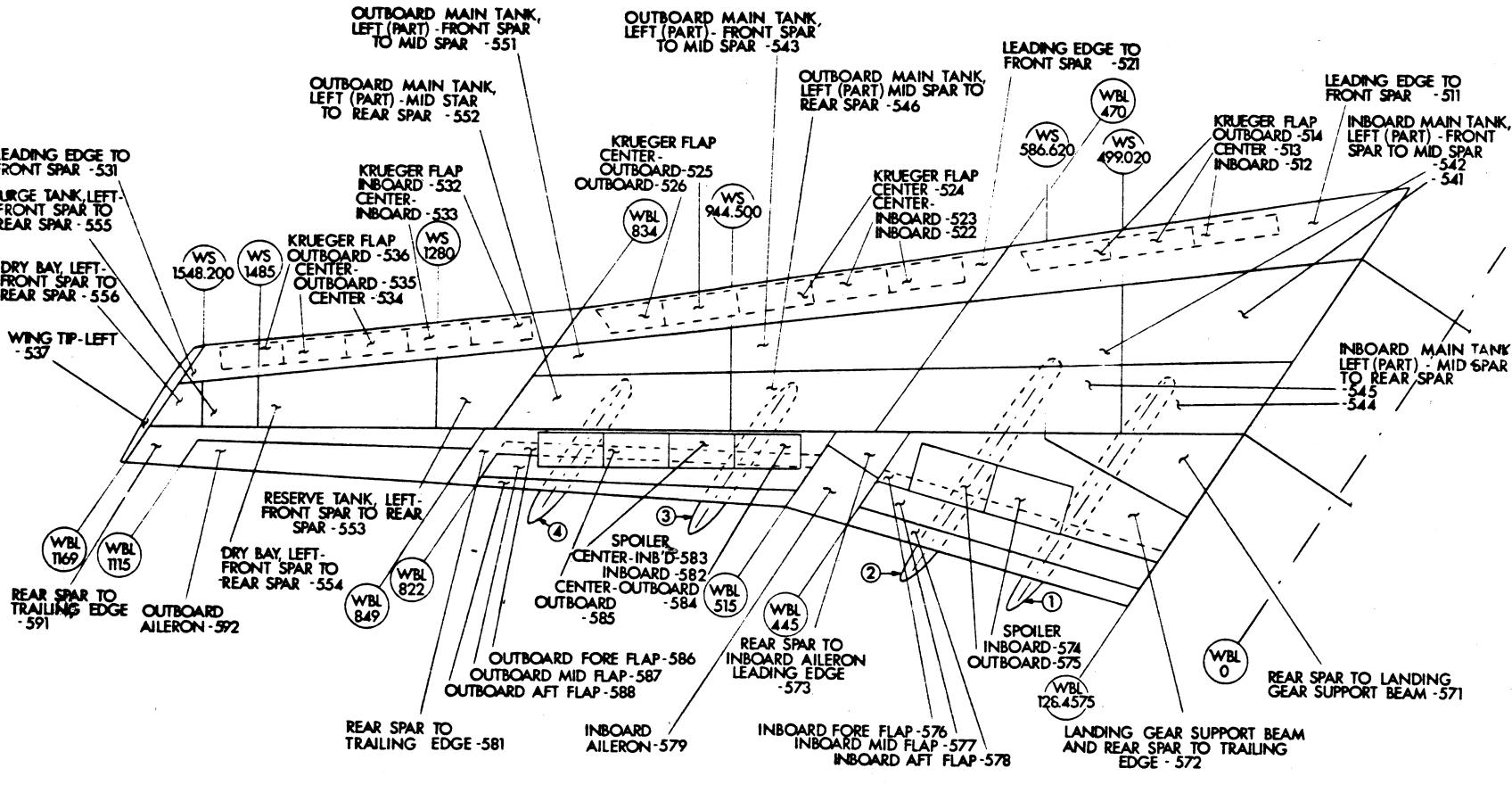
SUB-MAJOR ZONE 120 - Sta. 460 to Sta. 1000

SUB-MAJOR ZONE 130 - Sta. 1000 to Sta. 1480

SUB-MAJOR ZONE 140 - Sta. 1480 to Sta. 2160

SUB-MAJOR ZONE 150 - Sta. 2160 to Sta. 2360

SUB-MAJOR ZONE 190 - Fairings - Sta. 760 to Sta. 1700



Sample - Major Zone 500 Breakdown

Figure 2 (Sheet 1 of 2)

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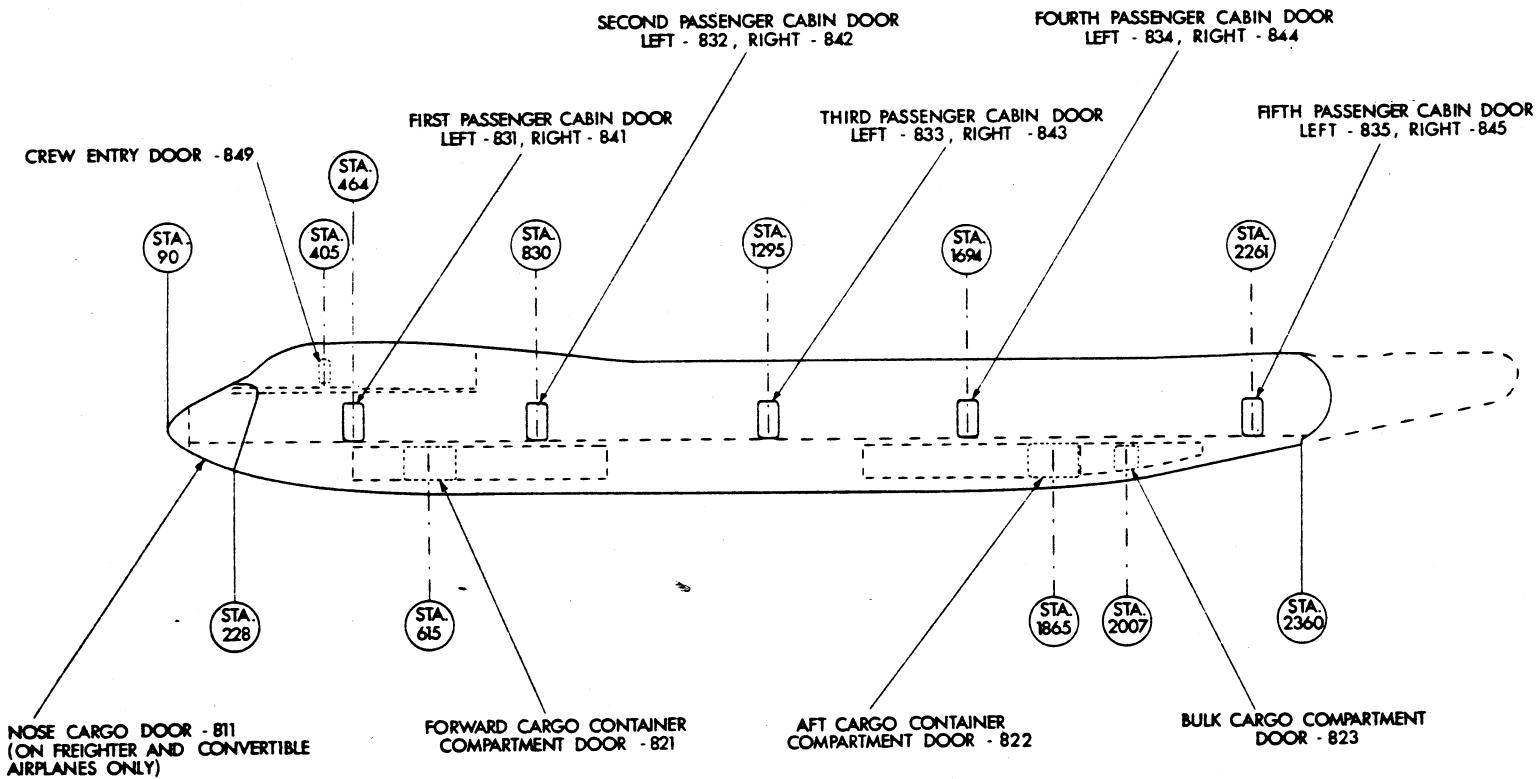
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MAJOR ZONE 500 - LEFT WING

- SUB-MAJOR ZONE 510 - Leading Edge to Front Spar
From WBL 128.4575 to WBL 470
- SUB-MAJOR ZONE 520 - Leading Edge to Front Spar From
WBL 470 to WBL 834
- SUB-MAJOR ZONE 530 - Leading Edge to Front Spar From
WBL 834 to WBL 1169 and Including
Wing Tip
- SUB-MAJOR ZONE 540 - Front Spar to Rear Spar From
WBL 128.4575 to WBL 470
- SUB-MAJOR ZONE 550 - Front Spar to Rear Spar From
WBL 470 to WBL 834
- SUB-MAJOR ZONE 560 - Front Spar to Rear Spar From
WBL 834 to WBL 1169
- SUB-MAJOR ZONE 570 - Rear Spar to Trailing Edge From
WBL 128.4575 to WBL 515
- SUB-MAJOR ZONE 580 - Rear Spar to Trailing Edge From
WBL 515 to WBL 849
- SUB-MAJOR ZONE 590 - Rear Spar to Trailing Edge From
WBL 849 to WBL 1169



Sample - Major Zone 800 Breakdown

Figure 3 (Sheet 1 of 2)

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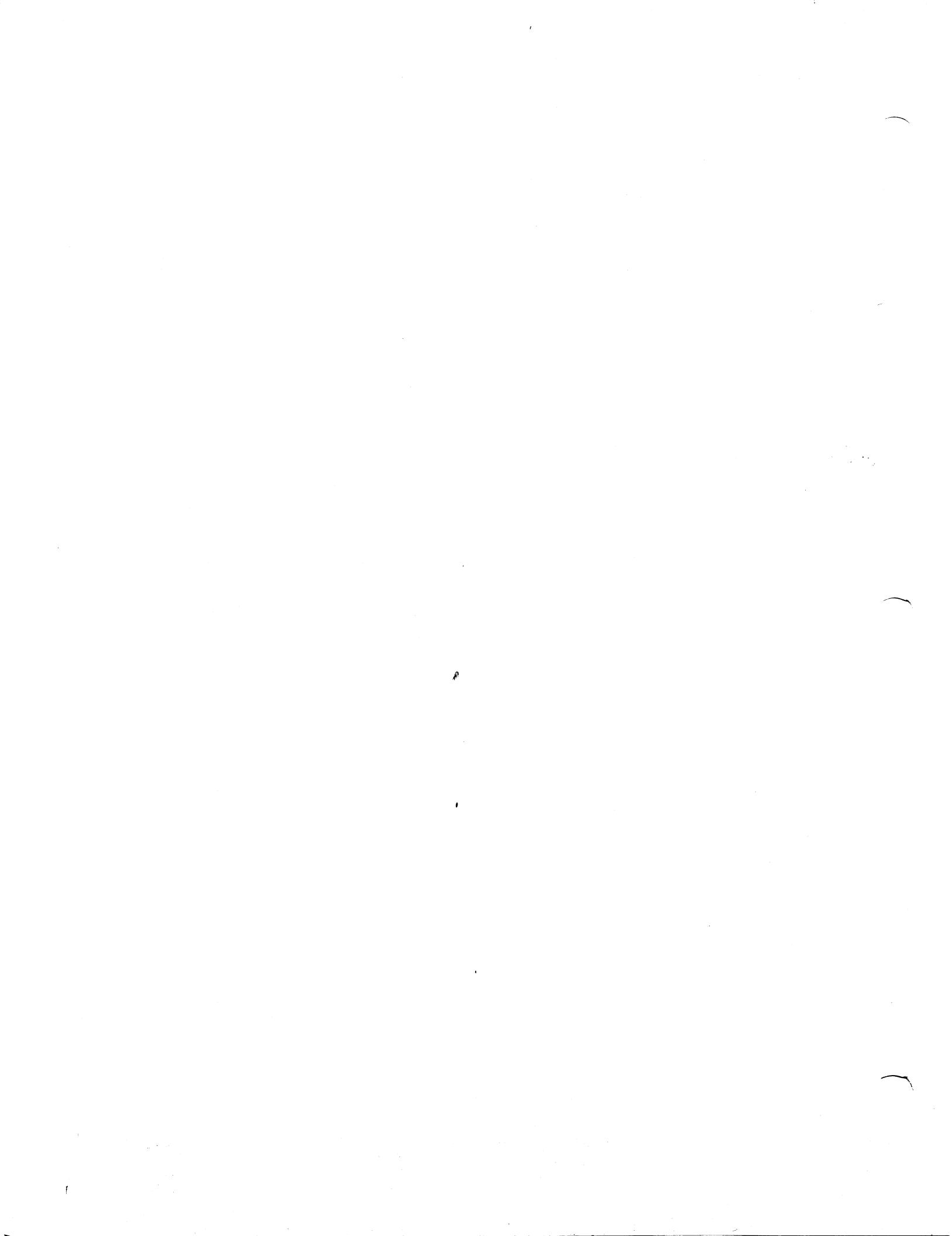
MAJOR ZONE 800 - DOORS (Passenger - Crew - Cargo)

SUB-MAJOR ZONE 810 - Lower Half of Fuselage, L. H. Side
From Sta. 90 to Sta. 2360

SUB-MAJOR ZONE 820 - Lower Half of Fuselage, R. H. Side
From Sta. 90 to Sta. 2360

SUB-MAJOR ZONE 830 - Upper Half of Fuselage, L. H. Side
From Sta. 134.75 to Sta. 2360

SUB-MAJOR ZONE 840 - Upper Half of Fuselage, R. H. Side
From Sta. 134.75 to Sta. 2360



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AIRLINE REQUIREMENTS FOR ACCESS DOOR

AND PANEL IDENTIFICATION

1. Scope

This portion of the specification defines the requirements for access door and panel identification. The requirements presented here shall be co-ordinated with the actual markings on access doors and panels to ensure a system which best suits the maintenance needs of the airlines.

2. Requirements

- A. Maintenance Manuals; Wiring Diagram Manuals and Structure Repair Manuals shall contain appropriate access identification diagrams clearly showing position of access doors, service doors, fillets, fairings, removable radio rack access panels, removable floor panels, removable cargo pit panels, and removable ceiling panels.
- B. All maintenance access doors, service doors, fillets, fairings, removable radio rack access panels, removable floor panels, removable cargo pit panels, and removable ceiling panels shall be identified as follows:
 - (1) The identification shall be prefixed by the three digit zone number that designates the smallest zone in which the door is located. (Ref. 1-6-1).
 - (2) A two letter suffix shall be utilized, consisting of a primary identifier and a locator.
 - (3) The first letter is the primary letter identifying the door in a logical sequence, i.e., inboard to outboard or front to rear, starting with "A" within each zone.
 - (4) The second letter, or locator fixes the door in its relation to the aircraft, if required, e.g.

T	-	Top
B	-	Bottom
L	-	Left Hand
R	-	Right Hand
Z	-	Internal

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Examples of access panel identification:

Panel Number

(Zone) + (Suffix)

521	AT	(Top of Wing)
521	CB	(Bottom of Wing)
321	AL	(Vertical Stabilizer - LH Side)
321	AZ	(Interior Vertical Stabilizer)

- (5) Cabin entrance doors, cargo doors, and main landing gear doors shall be identified by the zone number only since each is a zone in itself. (Ref. 1-6-1, Fig. 3).
- (6) The letters I and O shall not be used.
- (7) Blow-out doors and tank vents need not be assigned access door identifications.
- (8) Doors on the fuselage centerline shall be assigned the left hand zone number.
- (9) Doors in the vertical stabilizer and rudder shall be identified from bottom to top.
- (10) Corresponding doors on opposite sides of the airplane shall have the same letter designator even though zone numbers will differ.
- (11) When one door is located on a larger door the large door shall be lettered first.
- (12) If a door lies in more than one zone the lowest zone number involved shall be used. (Whenever possible zone boundaries shall not divide a door).
- (13) A door located on a zone boundary is numbered according to the zone from which it is removed.

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Maintenance Manual

POLICY

The Maintenance Manual shall provide sufficient information to enable a mechanic who is unfamiliar with the aircraft to service, trouble shoot and repair all systems and units, and to remove and replace any unit normally requiring such action on the line or in the hangar.

Manufacturer's "Customized" versions of the Maintenance Manual shall include the system of effectiveness identification specified in section 2-1-3. The system must be clearly and adequately explained in the Introduction section of the manual.

NOTE: The term "Customized" denotes a Maintenance Manual which contains information applicable to a particular customer only.

- | The Maintenance Manual shall not include that information which is required for shop overhaul (see 2-5-0); it shall also exclude Standard Practices and Time Limits in accordance with 1-1-3 and 1-2-1 of this specification and items which may vary with an individual airline's maintenance program.

All text shall be adequately illustrated.

The manufacturers shall make every possible attempt to have the Description and Operation portions of his publication complete and available well in advance of the first delivery of a new aircraft.

Preparation of Technical Data for certain chapters in the Maintenance Manual require joint contribution and close coordination between the airframe, engine and propeller manufacturers to insure continuity of instructions. To accomplish this the engine and propeller manufacturers will supply "shared interest" data to the airframe manufacturer for integration by him in his manual, as necessary. Copies of these data shall be sent directly to the customer. These areas of shared interest concern primarily the 70 series of chapters but are not so confined.

- | In shared interest chapters for description and operation and system trouble shooting the airframe manufacturer's masthead only shall be used; however, for unit trouble shooting and maintenance practices either the airframe, engine or propeller manufacturer's masthead may be used. If the airframe manufacturer changes the engine or propeller manufacturer's text or illustration in any way he shall apply his own masthead. If he simply changes the powerplant or propeller manufacturer's element and page number for continuity purposes he shall retain the powerplant or propeller manufacturer's masthead. In both the latter cases (i.e., if any change is made) he shall imprint a small vertical identification block on the binding margin of the page to indicate that a change has been made. The block shall contain the original manufacturer's identifier, element and page number and date.

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APPLICATION OF STANDARDS

1. Format and Illustration Standards

All the provisions of Chapter 1 of this specification apply to the Maintenance Manual except as noted in the Numbering System and the Effectivity Identification System.

2. Application of Standard Numbering System

A. The "Chapter-Section" Number: The numbering system used in the Maintenance Manual shall consist of a three-element number separated by dashes:

First and second digits - System/Chapter
Third and fourth digits - Sub-System/Section
Fifth and sixth digits - Unit/Subject

The following example illustrates and describes use of each element of the number:

Typical Chapter - Section - Subject Number _____

52-30-02

This number designates Chapter 52, the title of which is "Doors". _____

This number designates the section breakdown of material in Chapter 52 and represents "Cargo" doors. _____

This number designates a specific door. _____
In this case, -02 might represent "Right Forward Cargo Door"

The page number sequence is explained in _____

Page 201

B. Further instructions to aid in arranging material to fit this system follow:

- (1) Chapter: Chapterization, including titles and numbering shall be as shown in Section 1-3-2, Fig. 1, of this specification.
- (2) Section: Material in each chapter shall be divided into related sub-systems which shall be identified by the second element of the number.

These sub-systems shall consist of a group of inter-related units which perform a specific function within the confines of the overall system of which it is a part.

The sub-system breakdown for each chapter is shown in Section 1-2-1 of this specification.

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- (3) Subject: Each sub-system shall be divided into the units which make up that sub-system. These units shall be identified by the third element of the number.
- (4) Topic: The complexity and volume of material required for maintenance of the modern airplane dictates the need for breaking the subjects within manual chapters down into reasonably small topics for ready reference and ease of revision.

To accomplish this, page number blocks shall be used to separate subjects into topics. It is necessary to use a standard page block system so that topics may be broken out for special distribution - for example, Description and Trouble Shooting for distribution to Flight Engineers.

The standard page number blocks to be used for the Maintenance Manual are as follows:

Description and Operation- - - - - Page 1 to 100
Trouble Shooting- - - - - Page 101 to 200
Maintenance Practices- - - - - (See below)

In the case of a relatively simple unit, Description and Operation and/or Trouble Shooting coverage may not be required. In such cases the unused page number blocks shall be left open.

Maintenance Practices is actually a combination of the following sub-topics: Servicing, Removal/Installation, Adjustment/Test, Inspection/Check, Cleaning/Painting and Approved Repairs.

Two choices are allowed for numbering Maintenance Practices page blocks.

- (a) If all sub-topics under Maintenance Practices are brief, they may be combined into one topic entitled, for example, Main Landing Gear Uplatch - Maintenance Practices.

All such topics would be numbered within page number block 201-300.

- (b) Whenever individual sub-topics become so lengthy that a combination would require several pages, each sub-topic shall be treated as an individual topic. Page number blocks to be used are as follows:

Servicing	-301 - 400
Removal/Installation	-401 - 500
Adjustment/Test	-501 - 600
Inspection/Check	-601 - 700
Cleaning/Painting	-701 - 800
Approved Repairs	-801 - 900

Each new subject shall start with page 1, 101, 201, etc., and shall continue through the page block assignment to the necessary extent. The first page of each block shall be placed on a right hand page.

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- C. Numbering of the Contents of a Chapter: To provide a means for covering a complete system or sub-system and writing about it as an entity, the "dash zero" breakout is provided; i.e., the chapter number followed by a "-00-00" shall segregate that material covering the complete system; the chapter-section number followed by a "-00" shall be used for further details covering the sub-system.

In describing a complex system, made up of several sub-systems, the system description may be brief and need only describe what the sub-systems are, what functions they perform, where they are located and how the system is controlled. In describing a sub-system, the sub-system as a whole must be discussed in detail explaining where each unit or component is located, how each functions in the system, how they are interrelated and, if necessary, how the sub-system is controlled.

In the case of relatively simple units this descriptive coverage need be the only description of the unit contained in the Maintenance Manual. For example: If the sub-system being described were the AC Generator Drive, its description would be numbered 24-10-00. Contained within this description would be an explanation and description of the function of the generator drive disconnect switch. If it were necessary to write a Maintenance Practices publication covering Removal/Installation of this switch, it might be numbered 24-10-08. This latter publication would not contain additional unit description and there would be no pages in the 1-100 series under this number. The location of the unit and method of mounting would appear as part of the Maintenance Practices procedure.

In the case of a sub-system containing a more complex unit which would warrant a lengthy description to treat adequately, it might be desirable to separate the unit description. Even in this case, the sub-system description must be complete as to function and interrelationship of this unit within the sub-system. The separate unit description would explain in detail where the unit is located, how its function is performed, what adjustments can be made, how these adjustments affect performance, and how the unit is mounted. This type of write-up when needed would appear at the unit level in the 1-100 series of pages.

The further breakdown of the complete chapter should be accomplished by the page numbering as specified in 2-1-1. For example: 21-00-00, pages 1-15 would be a description of the complete Air Conditioning System, and pages 101-107 would show how to trouble shoot the complete system. In the same chapter 21-10-00, pages 1-10 would cover description of the compression sub-system, pages 101-102, trouble shooting of the compression sub-system and 21-10-12, pages 201-203 would contain maintenance practice information on a typical unit such as the manual compressor control valve.

- D. Numbering of Figures: Figures shall be numbered consecutively within each topic as follows:

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Figures in Description

1, 2, 3, 4, 5, etc.

Figures in Trouble Shooting

101, 102, 103, 104, 105, etc.

Figures in Maintenance Practices

When not sub-divided:

201, 202, 203, 204, 205, etc.

When sub-divided

Servicing - 301, 302, 303, 304, 305, etc.

Removal/Installation - 401, 402, 403, 404, 405, etc.

Adjustment/Test - 501, 502, 503, 504, 505, etc.

Inspection/Check - 601, 602, 603, 604, 605, etc.

Cleaning/Painting - 701, 702, 703, 704, 705, etc.

Approved Repairs - 801, 802, 803, 804, 805, etc.

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DEFINITIONS OF FUNCTIONS AND REQUIRED COVERAGE

1. Description and Operation

The purpose of this portion of the manual is to explain the location, configuration, function, operation and control of a complete system and its sub-systems. Sufficient description of units shall be included to enable the trainee to understand their construction and functioning to the extent necessary to enable him to adequately maintain and troubleshoot the system or sub-system. Where multiple sub-systems or units make up the complete system, this portion shall also explain the interrelationships between them. The information should be presented so as to be understandable to the mechanic trainee and should be in a form suitable for training. It should be written in a clear, logical, easy-to-read style profusely illustrated with, preferably, the same illustrations as used in training. As far as possible, this style and presentation shall be the same as that used in classroom teaching.

This type of publication shall be provided for each airframe and power plant system. It shall describe the system on three levels: System, Sub-system and Unit. Ref. 2-1-1 "Numbering of the Contents of a Chapter" for organizing and numbering this material at the system, sub-system and unit levels.

The Description and Operation topic at the system and sub-system levels shall open with a section entitled GENERAL. This section shall include: need or purpose of system or sub-system, major assemblies, outstanding features, and a brief description of how the system works. This introduction shall be followed by a detailed write-up of each major assembly and the units within that assembly, where the units are not sufficiently complex to warrant inclusion under the third element of the chapter number. When the units are of a complex nature, only a general description of the unit shall be given in this section. The section shall close with a detailed description of overall system or sub-system control.

Peculiarities of individual systems may dictate minor changes in this style of presentation, but it shall be followed as closely as possible.

2. Trouble Shooting

Trouble shooting in a complex system is a matter of knowing what sections can cause the trouble, isolating the trouble into the one that is causing it; then knowing what units in the faulty section can cause the trouble, isolating the trouble into the one that is causing it, and correcting the cause. Begin by listing the common troubles in order of frequency. Trouble shooting text shall be supplemented with appropriate trouble shooting charts. (Ref. Fig. 1 in this section). This pattern is intended to present the information and steps necessary to "shoot" trouble. Good trouble shooting is done by rationalizing rather than by guess work. Consequently, these procedures should be grouped under three basic functions as follows:

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- A. Possible Causes: The first step in listing possible causes of each trouble is to show what sections of the system may be at fault. List these sections under each trouble in order of probability. In addition, under each section, in order of probability, list the unit conditions that may be causing the trouble.
- B. Isolation Procedure: Under this heading, list any notes or key points necessary in isolating the trouble into the sections and components.
- C. Correction: In this column, list any notes or key points involved in correcting the trouble in the unit.

3. Maintenance Practices

"Maintenance practices" are a combination of servicing, removal/installation, adjustment/test, inspection/check, cleaning/painting, and approved repairs.

When the required maintenance procedure is not lengthy and is relatively simple, a combination of the above may be grouped under one heading and called Maintenance Practices.

4. Servicing

Servicing in this application is that servicing required on units as the result of the accomplishment of any other maintenance practice. It includes items such as the inflation or refilling of shock struts, the lubrication of control cables, the sterilizing of potable water systems, etc.

5. Removal/Installation

The removal/installation portion shall state clearly the sequence of steps required to remove and reinstall a component or unit, along with precautions to be observed.

Any adjustments that are necessary as a part of the installation shall be in the text in proper sequence.

Reverse procedure from removal is not acceptable.

6. Adjustment/Test

The adjustment/test portion shall provide instructions for accomplishment of a test or check to assure the integrity as an operational component of a system, sub-system or unit assembly.

Such tests or checks will vary in complexity and stringency according to the conditions under which the unit functions or may have been replaced. It is not intended that a complex functional test of a complete system and its attendant closer tolerances be performed if the unit replaced reactivates the system and operates within the confines of a go-no-go specification.

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Following are definitions of three categories of tests that shall apply:

A. Operational Test

That procedure required to ascertain only that a system or unit is operable. These tests should require no special equipment or facilities other than that installed on the aircraft and should be comparable to the tests performed by the flight crews. It is not intended that the operational test of the unit shall meet the specifications and tolerances ordinarily established for overhaul, or major maintenance periods.

B. Functional Test

That procedure required to ascertain that a system or unit is functioning in all aspects in accordance with minimum acceptable system or unit design specifications. These tests may require supplemental ground support equipment and should be more specific and detailed than an operational test. It should contain all necessary information to perform proficiency tests to maintain system or unit reliability at an acceptable level, without reference to additional documents. A functional/test is tests at minor maintenance periods.

C. System Test

That procedure containing all adjustment specifications and tolerances required to maintain system and/or unit performance at maximum efficiency and design specifications. It shall be self-contained and may duplicate other tests. It is normally used at major maintenance periods.

It is understood that compliance with the above can in some instances cause duplication of test procedures which is acceptable. Unit or assembly removal/installation procedures may reference a system/sub-system test only if the major test procedure is so unitized that the individual assembly/unit test may be called out without overlap and accomplishment shall not require completion of the whole system test.

7. Inspection Check

The inspection/check portion shall provide information and procedure necessary to gain access to and inspection of a system, a unit, or an area. All forms and manner of inspection shall be covered, both minor and thorough.

8. Cleaning/Painting

The cleaning/painting portion shall provide information as to material and procedure necessary to clean and paint an area or areas, and contain safety precautions necessary to protect personnel and material. Materials shall be identified by generic names and by MIL or AMS specification number where applicable.

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9. Approved Repairs

The approved repair portion shall include processes and technique necessary for performing a repair. Special tools, equipment and materials shall be included. Includes specifications and limitations as to when a repair is required for safe operation such as: what is a leak and when does it require repair. Excludes repairs contained in the Structural Repair Manual (Section 2-3 of this specification).

10. Text Preparation

The material required above shall be presented as follows:

It is intended to get across an over-all idea of the job. It should provide an introduction to the work, and a base on which to build the instruction which follows. This job knowledge should include:

- A. Reasons for the Job/Use and Limitations of the Process: This gives purpose to the work and the learning of it: List the reasons/uses and limitations in detail.
- B. Scope of Work Involved: What the job consists of - what is to be worked on - what operations are to be done. These give direction to the job.
- C. Equipment and Materials: List the tools, equipment and materials required in the job which are not normally included in the mechanic's tools.
- D. Procedure: This requires a breakdown of the job into logical steps or operations.
 - (1) Basic Steps or Operations: Some jobs or processes consist of several basic operations, with a number of minor steps or work items under each. Others are built around a single operation, and the breakdown results in just work items. In either case, first determine the basic operations or steps in the job or process, as the experienced man does them, and list them. The first step should always be Job Set-Up, and the last should be Close-Up or Clean-Up. The replacement of a unit, for example, would involve: Job Set-Up, Removal, Installation, Test, Adjustment, and Close-Up.
 - (2) Detail Steps or Work Items: After the basic operations have been broken out, they should be examined and the minor steps or work items which make up each should be listed. The detail should be extended down to, but not include, such common practices as tightening a nut, removing a bolt, etc. However, such details should be included when they are of a specific nature.

Example: The removal step in the replacement of the hydraulic reservoir breaks down into:

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Following are definitions of three categories of tests that shall apply:

A. Operational Test

That procedure required to ascertain only that a system or unit is operable. These tests should require no special equipment or facilities other than that installed on the aircraft and should be comparable to the tests performed by the flight crews. It is not intended that the operational test of the unit shall meet the specifications and tolerances ordinarily established for overhaul, or major maintenance periods.

B. Functional Test

That procedure required to ascertain that a system or unit is functioning in all aspects in accordance with minimum acceptable system or unit design specifications. These tests may require supplemental ground support equipment and should be more specific and detailed than an operational test. It should contain all necessary information to perform proficiency tests to maintain system or unit reliability at an acceptable level, without reference to additional documents. A functional/test is tests at minor maintenance periods.

C. System Test

That procedure containing all adjustment specifications and tolerances required to maintain system and/or unit performance at maximum efficiency and design specifications. It shall be self-contained and may duplicate other tests. It is normally used at major maintenance periods.

It is understood that compliance with the above can in some instances cause duplication of test procedures which is acceptable. Unit or assembly removal/installation procedures may reference a system/sub-system test only if the major test procedure is so unitized that the individual assembly/unit test may be called out without overlap and accomplishment shall not require completion of the whole system test.

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8. Cleaning/Painting

The cleaning/painting portion shall provide information as to material and procedure necessary to clean and paint an area or areas, and contain safety precautions necessary to protect personnel and material.

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9. Approved Repairs

The approved repair portion shall include processes and technique necessary for performing a repair. Special tools, equipment and materials shall be included. Includes specifications and limitations as to when a repair is required for safe operation such as: what is a leak and when does it require repair. Excludes repairs contained in the Structural Repair Manual (Section 2-3 of this specification).

10. Text Preparation

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- A. Reasons for the Job/Use and Limitations of the Process: This gives purpose to the work and the learning of it: List the reasons/uses and limitations in detail.
- B. Scope of Work Involved: What the job consists of - what is to be worked on - what operations are to be done. These give direction to the job.
- C. Equipment and Materials: List the tools, equipment and materials required in the job which are not normally included in the mechanic's tools.
- D. Procedure: This requires a breakdown of the job into logical steps or operations.

- (1) Basic Steps or Operations: Some jobs or processes consist of several basic operations, with a number of minor steps or work items under each. Others are built around a single operation, and the breakdown results in just work items. In either case, first determine the basic operations or steps in the job or process, as the experienced man does them, and list them. The first step should always be Job Set-Up, and the last should be Close-Up or Clean-Up. The replacement of a unit, for example, would involve: Job Set-Up, Removal, Installation, Test, Adjustment, and Close-Up.
- (2) Detail Steps or Work Items: After the basic operations have been broken out, they should be examined and the minor steps or work items which make up each should be listed. The detail should be extended down to, but not include, such common practices as tightening a nut, removing a bolt, etc. However, such details should be included when they are of a specific nature.

Example: The removal step in the replacement of the hydraulic reservoir breaks down into:

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DETAIL STEPS/WORK ITEMS

Relieve system pressure
Open and tag by-pass valve
Bleed reservoir air
Drain reservoir
Disconnect liquidometer
Disconnect and cap lines, plug ports
Remove sight gauge and bracket assembly
Remove reservoir and fittings from reservoir

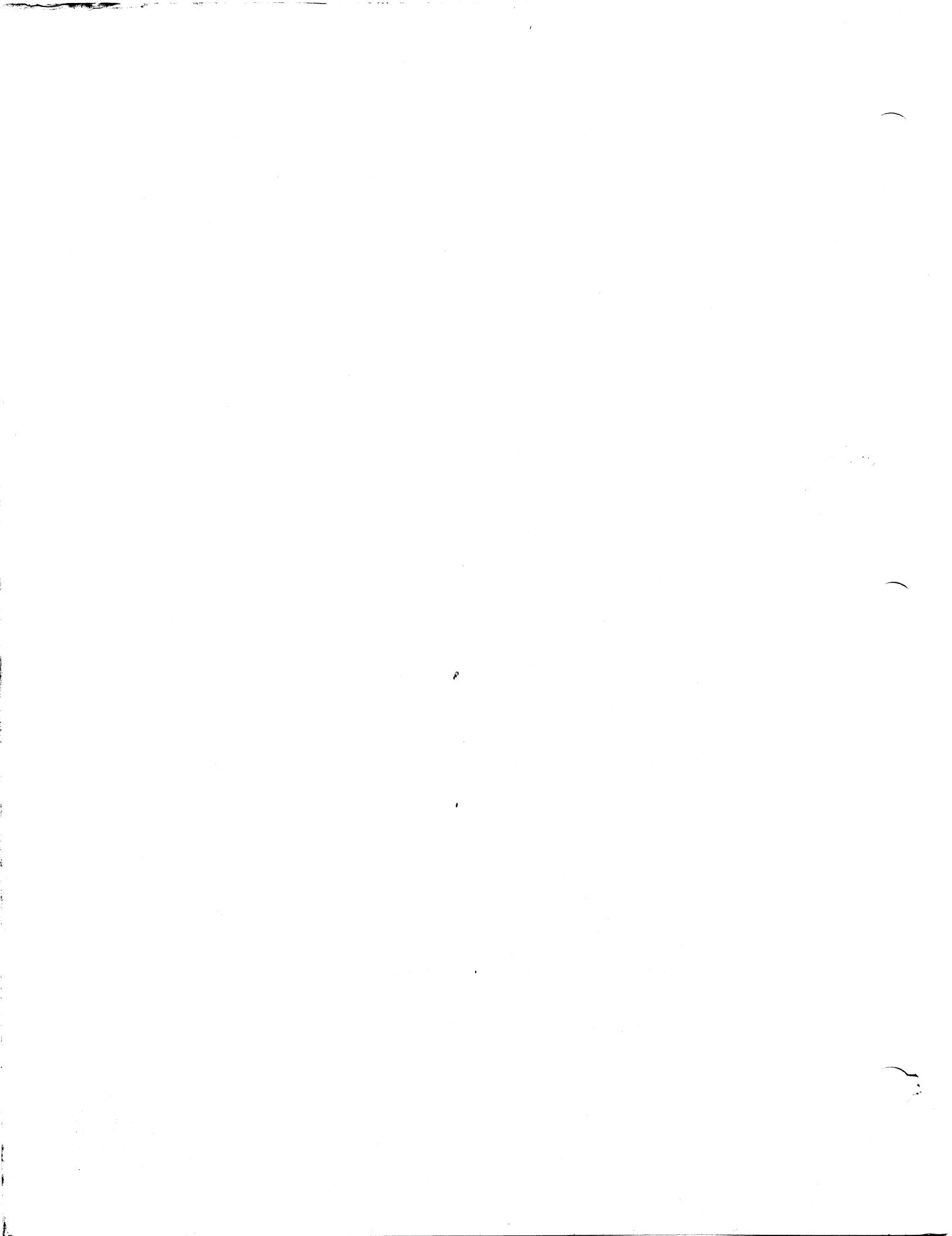
- (3) Key Items or Cautions: Just listing the steps in a job leaves much to be desired. In every operation there are key items that make or break the job. These consist of:

Personal safety precautions
Cautions regarding steps in which the work or equipment can easily be damaged
Cautions to insure quality and airworthiness
Cautions against forgetting details

Re-analyze the breakdown in terms of the factors stated above, and list the key items as cautions or notes adjacent to the work to which they apply.

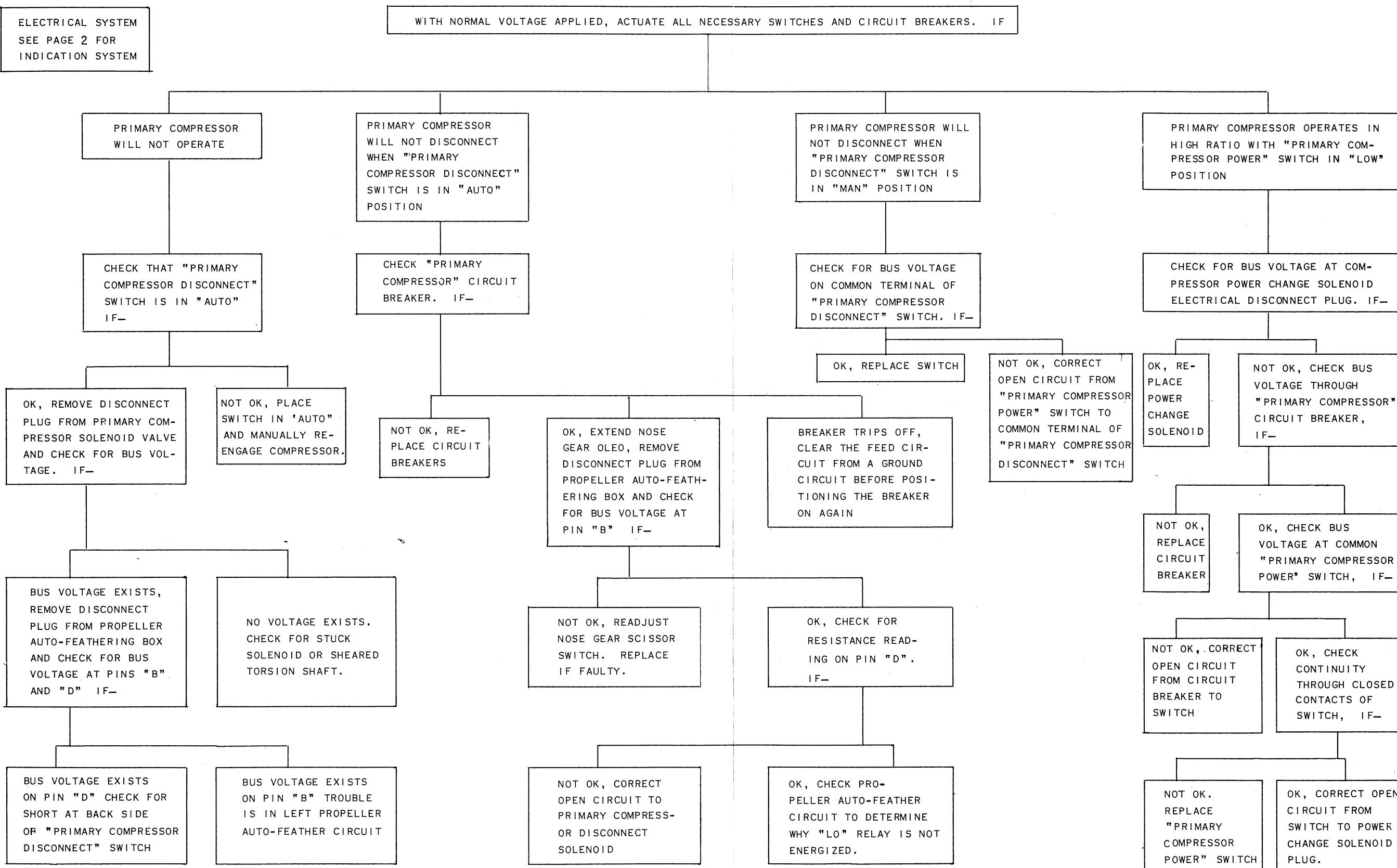
Example: Adding the key items to the hydraulic reservoir removal step would work out as:

<u>DETAIL STEPS/WORK ITEMS</u>	<u>KEY ITEMS</u>
Relieve system pressure	Flaps clear - wheels chocked - gear pin IN
Open and tag by-pass valve	Red tag - tie securely
Bleed reservoir air	
Drain reservoir	Avoid spillage
Disconnect liquidometer	Fragile
Disconnect and cap lines, plug ports	Avoid distortion
Remove sight gauge and bracket assembly	Fragile
Remove reservoir and fittings	Note angle of fittings



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Sample Trouble Shooting Chart
Figure 1

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Maintenance Manual

DEFINITION OF EFFECTIVITY IDENTIFICATION

1. General

- A. Manufacturers' "customized" versions of the Maintenance Manual shall include the following effectivity identification system. This system provides direct annotation on each page of the manual, expressed by a six-digit alpha or numeric indicator by which the customer chooses to identify the aircraft.

The six-digit alpha or numeric indicator shall begin with the last three digits of the lowest assigned number, to indicate first effectivity, and end with the last three digits of the highest assigned number, to indicate last effectivity, of an unbroken sequence of assigned numbers. A hyphen shall be shown between the numbers. Open ended effectivity shall be indicated by "999" in the last effectivity. For example: 905-999 indicates aircraft 905 and subsequent.

- B. Effectivity identifications shall be placed in the effectivity block of each page of the manual. When a page applies to all aircraft of a customer, the word "ALL" shall be entered in the effectivity block. This also applies to contents pages. All information appearing on a page shall apply only to the aircraft noted in the effectivity block of that page.

2. Method of Indicating Effectivity

Effectivity differences shall be shown on manual pages as follows:

- A. When effectivity differences can be applied or added to a page containing a diagram, illustration, chart, or table, a flag note shall be used to reflect effectivity within the aircraft covered by the page effectivity block (Ref. Fig. 1). An additional page shall be added immediately following any page containing a diagram, illustration, chart, or table requiring an effectivity difference that cannot be incorporated using flag notes.
- B. Effectivity differences shall be reflected within the text of the manual by lead-in effectivity statements at the beginning of paragraphs that limit the effectivity of information contained in the paragraph (Ref. Fig. 2).
- (1) When effectivity differences are extensive and the preceding method of reflecting effectivity becomes cumbersome, thus distracting from the continuity of subject matter, additional page blocks shall be

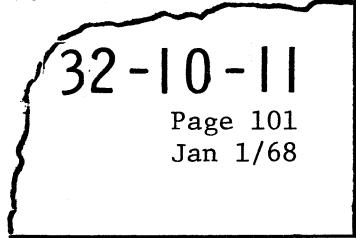
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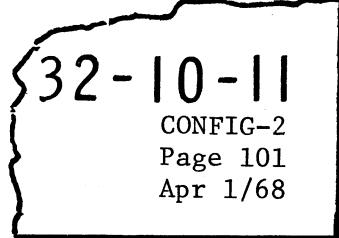
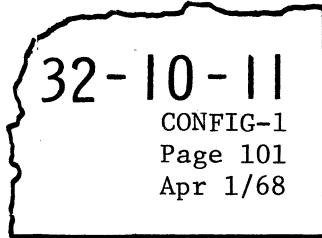
established applicable to groups of aircraft. These added page blocks shall be further identified by the addition of a configuration code following the Chapter/Section/Subject number. A previously issued page block shall be reissued to incorporate the configuration code.

EXAMPLE:

Was:



Becomes:



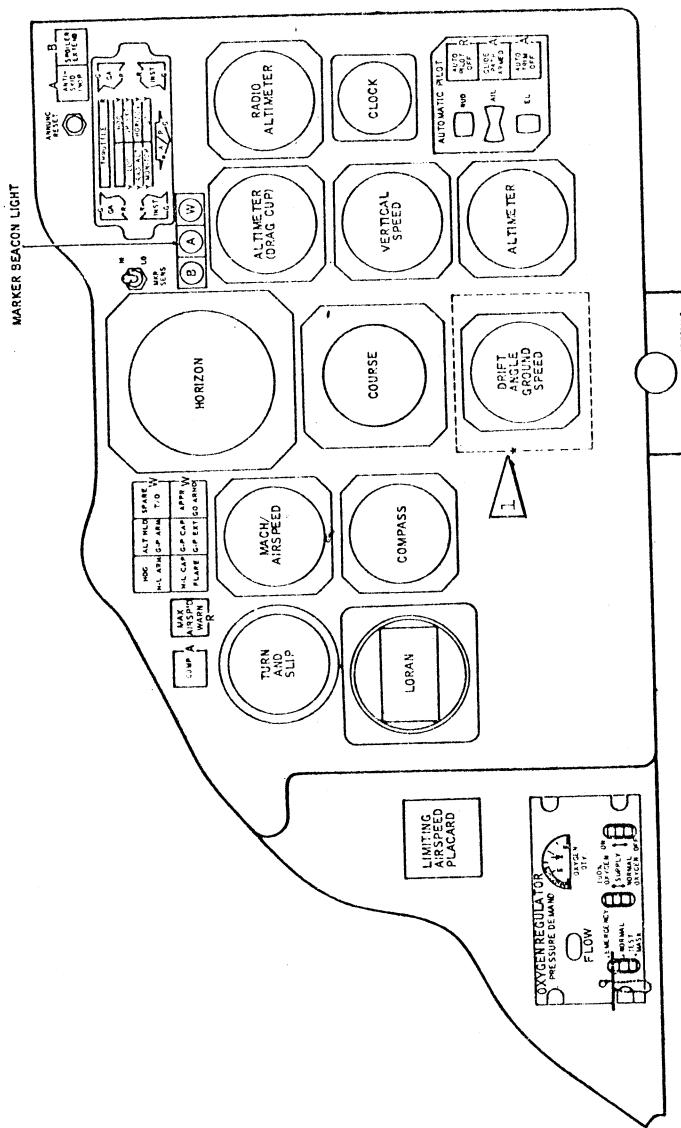
NOTE: Configuration codes shall be issued at page block level only. The use of these codes should be kept to a minimum and shall only be used when a configuration change to the aircraft results in a major change to the manual text. It shall not be used for changes in procedure when the aircraft configuration has not changed.

- (a) Configuration codes (CONFIG) shall only be applied when there is a multiple configuration of page blocks applicable to a customer's aircraft.
- (b) Configuration codes shall always be in ascending, sequential numerical order, i.e., CONFIG-1, CONFIG-2, CONFIG-3, etc.

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MAINTENANCE MANUAL



Captain's Flight Instrument Panel
Figure 1

EFFECTIVITY: ALL

31-10-00

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Sample Page - Customized Illustration
Figure 1

2-1-3

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MAINTENANCE MANUAL

PITOT-STATIC SYSTEM

O 1. Description

On all aircraft except 779, two pitot systems, the captain's and the first officer's, are installed. The captain's system supplies pitot pressure to his indicated airspeed indicator and machmeter. The first officer's system supplies pitot pressure to his indicated airspeed indicator, the machmeter, the autopilot, the flight recorder, the pitch trim compensator, and the maximum airspeed sensor. A cutoff valve is installed in the first officer's system to provide a means of shutting off the supply of pitot pressure to the autopilot, to the pitch trim compensator, the flight recorder and to the maximum airspeed sensor. The pitot tubes for the captain's and first officer's systems are located on the fuselage upper nose section, one on each side of the centerline. Both pitot tubes are equipped with electrical heating elements for anti-icing.

O On aircraft 779, three pitot systems, the captain's, the first officer's and the alternate, are installed. The captain's system supplies pitot pressure to his indicated airspeed indicator and machmeter. The first officer's system supplies pitot pressure to his indicated airspeed indicator, machmeter and the maximum speed sensor. The alternate system supplies pitot pressure to the pitch trim compensator, the autopilot, and the flight recorder. The pitot tubes are located on the fuselage upper nose section. The captain's pitot tube is mounted on the left, the first officer's on the right, and the alternate on the fuselage centerline. The pitot tubes are equipped with electrical heating elements for anti-icing.

Four static systems, three normal, and one alternate are installed. The captain's, first officer's, and the autopilot static systems are referred to as the normal systems. Each of the four static systems has two static ports, one located on each side of the fuselage, aft of the forward door of the forward cargo compartment. The captain's system supplies static pressure to the corresponding indicated airspeed indicator, altimeter, rate of climb indicator, barometric altimeter and machmeter. The first officer's system supplies static pressure to the corresponding indicated airspeed indicator, altimeter, rate of climb indicator, and machmeter. The autopilot static source supplies static air pressure to the autopilot, to the flight recorder, to the pitch trim compensator, and to the maximum airspeed sensor.

On all aircraft except 601 thru 610, the alternate static system normally supplies pressure to the cabin pressure controller, the cabin altitude and differential pressure indicator and the manifold pressure indicator.

On aircraft 601 thru 610, the autopilot source supplies pressure to the cabin pressure controller, the cabin altitude and differential pressure indicator and the manifold pressure indicator.

O EFFECTIVITY: ALL

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Sample Page - Customized Text
Figure 2

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Wiring Diagram Manual

POLICY

This specification covers aircraft wiring only. It is desirable that component manufacturers adhere to these standards to the maximum extent possible.

The Wiring Diagram Manual is provided to illustrate all aircraft circuits. It need not include detail circuits of accessories. The diagrams shall sufficiently describe the circuits to enable trouble shooting and servicing of electrical systems during aircraft service and overhaul.

The manufacturer shall supply:

- | Reproducible master wiring diagrams and schematics and charts of the same size as manual pages printed on a translucent material from which copies may be made by either contact printing or direct photography. (In the event that the manufacturer's original working master is of the same size as the manual pages, then only one master shall be supplied).
- | Reproducible master wiring diagrams and schematics and charts of the same size as the manufacturer's original working master printed on a translucent material to which revisions may be made by pencil or ink marks and by eradication; and from which copies may be made by either contact printing or direct photography.

Printed Wiring Diagram Manuals.

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APPLICATION OF STANDARDS

1. Format and Illustration Standards

All the provisions of Chapter 1 of this specification apply to the Wiring Diagram Manual except: Characters or numbers of the original full size manufacturer's wiring diagrams shall be legible in final printed form so that their minimum height after reduction to manual size will not be less than .060 inches. Type shall be sans serifs. Marginal limitations shall not apply except that the binding edge shall be 1 1/8". Standard Practices shall be in accordance with 2-2-2 of this specification.

2. Application of Standard Numbering System

The standard arrangement of material and numbering system shall apply to this publication. A three element number shall be used.

Each chapter shall contain both wiring diagrams and schematics. Diagrams or schematics illustrating a complete system or sub-system shall be identified by the "Dash Zero" breakout. Example: 22-10-00 page 1, 101, etc. Wiring diagrams for any subject shall be numbered consecutively, starting with page 1; schematics starting with page 101. In most cases there shall be only one page for each of the wiring diagrams; however, the succeeding pages may be assigned as systems are revised by the operator or manufacturer. For example: page 1 of a certain diagram would be the original diagram and page 2 would be the diagram for a change in the system. If page 2 would be a diagram for a projected fleet revision, page 1 would remain in the manual until the project was completed for the entire fleet and then removed. This will make it possible to retain as many different configurations of a system at one time as are necessary.

Logic Diagrams included in the Wiring Diagram Manual shall be considered as schematics for pagination purposes. Logic symbols and basic logic diagrams may also be used for internal schematics of components on wiring diagrams when logic devices are used in the construction of such components. Detailed logic diagrams shall be drawn for all circuits employing logic devices.

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PRESENTATION

1. Manual Content

A. Introduction

- (1) The introduction shall explain the make-up and use of the manual. It shall include the electrical and electronic symbols used in the manual, the identification of switch terminals (if not shown completely on the individual wiring diagrams), the methods of identifying terminal strips and connector pins, wire specifications and the wire number system. It shall also include a statement as to the status of the aircraft as shown on the diagram; i.e., aircraft on the ground or in flight, attitude of the aircraft, power on or off, etc. It shall also include zoning, access door and panel identification diagrams. (Ref. 1-6 of this specification.)

B. Standard Practices

- (1) Maintenance practices for the termination of wires, installation of connectors and splices, preparation of "pigtailed" and termination points for shielding, grounding straps and ground studs, harnesses and bundles shall be prepared and placed in a separate chapter. This chapter shall also contain any specific maintenance practices necessary for the installation and maintenance of electrical and electronic conductors, disconnect and termination points. The chapter shall be identified as "Chapter 20 - Standard Practices."

C. Electrical and Electronic Equipment Lists

- (1) An equipment list is to be included for electrical/electronic units. This list shall consist of a numerical-alphabetical listing of equipment designators, a description (noun and principal modifiers) of the equipment, the AN/MS or equivalent (where applicable) and the manufacturer's part number, the manufacturer's code number derived from the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1, (or manufacturer's name where the manufacturer is not entitled to such identification), and the quantity required. A blank column one inch wide adjacent to "manufacturer's part number" shall be reserved for use by the operator to list stock numbers, etc.

In addition, the manufacturer shall be prepared to provide such a list in alphabetical-numerical order upon request of the operator.

D. Electrical and Electronic Wiring Diagram Indexes

- (1) In addition to the manual Table of Contents, an alphabetical index of sub-sub-systems shall be provided. This shall consist of an alphabetical listing of sub-sub-systems covered in the wiring diagram manual and shall identify the chapter in which the sub-sub-system is located. The sub-sub-system titles assigned shall agree with those used in the maintenance manual and illustrated parts catalog.

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- (2) In addition to the Chapter Table of Contents (Ref. 1-1-2) a numerical index shall be provided in front of each chapter of the wiring diagram manual. This shall consist of a numerical listing of all diagrams in the chapter, circuit description, issue or revision date and aircraft serial numbers to which the page applies.

E. Electrical and Electronic Wiring Diagrams

- (1) Wiring diagrams shall be provided for all electrical and electronic circuits. Each diagram shall be complete by itself and contain sufficient information to allow circuit repair and/or modification without reference to other documents. Additional requirements for wiring diagram make-up are provided under Subject Coverage.

A sample wiring diagram is shown in 1-1-3, Fig. 10.

F. Electrical and Electronic Schematics

- (1) Complete schematic diagrams shall be drawn for all complex systems such as air conditioning, AC or DC power generation and distribution, interphone, landing gear position and warning, autopilot, etc. Sufficient notes such as function and operation criteria shall be included on the schematic to permit a person familiar with normal system operation to use the schematic in trouble shooting without additional instructions.

A sample schematic is shown in 1-1-3, Fig. 9.

G. Logic Diagrams

- (1) Logic diagrams shall be drawn for all systems and components which employ logic, or two-state, devices in their construction. The two types of logic diagrams used are as follows:

- (a) The Basic Logic Diagram shall be used to depict the internal circuitry of components and to illustrate the basic signal flow in a system. The devices are to be identified as to type only with no attempt made to show signal strength, value or sequence. No unit specifications are required and connector identification may be omitted (Ref. 1-1-3, paragraph F.)
- (b) The Detailed Logic Diagram shall be used to depict systems and complex components and is detailed in nature. It shall show sufficient information to allow for system trouble shooting without additional information. (Ref. 1-1-3, paragraph F.)

H. Electrical and Electronic Charts

- (1) Connection diagrams or charts shall be drawn for all major dis-

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connect plugs or panels, conduit or wiring routing, junction boxes and for all wires (including spares.)

2. Subject Coverage

A. Electrical and Electronic Wiring Diagrams

- (1) Individual wiring diagrams shall be limited to one per page. Complex electrical and electronic systems will require simplification to the extent that the individual functions of the system may be presented on separate pages, numbered consecutively and containing adequate cross referencing.
- (2) Where practical, the wiring diagram layout shall be arranged to be viewed from the bottom of the page, in which case the left margin shall correspond to forward on the aircraft; or the wiring diagram layout shall be arranged to be viewed from the right margin, in which case the bottom of the page shall correspond to forward on the aircraft. Numbers and characters shall be arranged to be read from the bottom and/or right hand margins of the page.
- (3) As closely as possible layout on the page shall correspond, left and right, to forward and aft on the aircraft.
- (4) Identification of switches, circuit breakers, etc., shall be clearly stated adjacent to the symbols. If possible the same wording shall be used as shown on the placard in the aircraft. The circuit function shall be labeled adjacent to the switch contact as applicable.
- (5) Ratings shall be included on circuit breakers, fuses, resistors and capacitors.
- (6) Junction boxes and shields shall be shown.
- (7) Location identification in conformity with 1-6 of this specification, i.e., smallest zone number, followed by Fuselage/Wing station number shall be indicated adjacent to each component, disconnect, splice, terminal strip, ground terminal point, junction box, shield, etc.
- (8) An equipment number item designator consisting of a number character combination shall be located adjacent to each item of equipment. Such an item designator shall be provided for all components, units or assemblies such as, but not necessarily limited to, manufacturer's fabricated modules and accessory boxes, APU, CSD, galleys, lavatories, air conditioning packs, turbo compressors, etc., which can practically be replaced in the field. In addition the item designator shall be listed in the electrical and electronic equipment list.

NOTE: This requirement shall not apply to internal components of electrical/electronic units that ordinarily require shop or bench test after installation.

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- (9) Cross reference information shall be indicated on all wiring diagrams where the complete connection of a wire is not shown on one page but must be continued on another page. Cross reference shall be by ATA number printed adjacent to the wire segment number. Should space limitations dictate the location of the cross reference at a point other than at the wire segment number, an arbitrary code number or character shall be assigned and printed on each page adjacent to the wire segment number and noted along with the page number and an abbreviated circuit description of the cross reference page under "NOTES" or "LEGEND." (Ref. 1-1-3, Fig. 10.)
- (10) Conduit information shall not be shown on the wiring diagram circuit pages. This information shall be provided on charts as specified in Subject Coverage for these charts.
- (11) All terminal strips, plugs, relays and other electrical components which are depicted in the chart section of the wiring diagram manual shall have an appropriate note which shall reference the applicable chart.
- (12) Internal simplified schematics shall be drawn for at least one of each type of equipment shown on the page. In cases where the components of this equipment are replaceable maintenance items, the appropriate equipment reference designator shall be shown. Cross references to equipment in which common internal circuitry are shown shall be placed within the equipment. Should space limitations dictate the cross reference at a point other than within the equipment, an arbitrary code number or character shall be assigned and printed within the equipment. The arbitrary code number with reference to the equipment showing the internal schematic shall be placed under "NOTES" or "LEGEND." On electronic units manufactured under ARINC specifications, the functions shall be labeled as shown in the specific ARINC report.
- (13) Internal jumpers, ground connections, and significant input and output voltages that are constant in magnitude and nature shall be shown.
- (14) All pins of disconnect plugs mating with major units, to which wires are connected internally and/or externally, shall be shown and the connection indicated. Spare or unused wires shall be indicated as "spare."
- (15) Wiring diagrams shall include antenna circuitry.
- (16) Each terminal point shall be identified by number. At each point where a wire connects, the wire number shall be indicated. Spare wires shall be noted as "spare."

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- (17) Wire connections between terminals and disconnect points and between electrical components, shall be drawn as direct as possible. In complex wiring diagrams only, it is desirable to "bundle" or "group" wires provided that all wires in the bundle go between the same two terminal points and that wire numbers are shown at both ends.
- (18) Terminal strips or disconnects shall be drawn arranged so that stud or pin numbers progress in a manner that allows for a minimum of wire crossings.
- (19) Wiring material and installation specification notations of a general nature shall be listed in the wiring diagrams preface pages. Those of a limited application shall be listed on the affected wiring diagram. Number or character reference codes shall be assigned and drawn on the diagram page and listed on the preface pages to provide cross reference from the wire to the specification.
- (20) Power sources shall be shown as complete as possible on each wiring diagram. In the event this is impractical the abbreviated power source details shall be drawn with dotted lines and a cross reference added to show the wiring diagram on which the complete power source details are shown.
- (21) Power distribution wiring diagrams shall be provided for all primary and secondary buses up to and including the circuit breakers which feed individual sub-sub-systems.

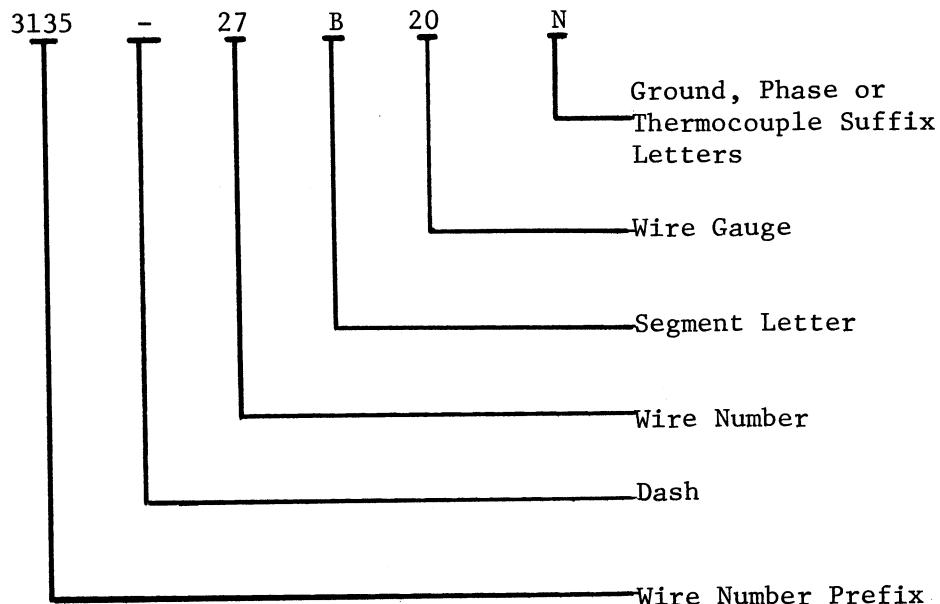
B. Wire Identification Coding

- (1) To facilitate maintenance, each wire cable and coaxial cable shall be identified and marked as applicable with an identification code.
- (2) The code shall consist of a combination of letters and numbers called out on the diagrams, wire lists, and other electrical or electronic drawings and imprinted upon the wire or cable itself, or on an identification sleeve. The following requirements shall apply:
 - (a) The identification shall consist of the first four digits (dash symbol not required between first and second element numbers) of an ATA number assigned to the system/sub-system/sub-sub-system (prefix) followed by a Dash, Wire Number(s), Segment Letter(s), Wire Gauge, and Phase/Ground/Thermocouple suffix. Example:

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- (b) The prefix to each wire identification need not be shown on the diagram if a note similar in content to the following appears on the Wiring Diagram:

NOTE: Unless otherwise specified, prefix all wire identification with ATA system/sub-system/sub-sub-system number, i.e., 3135.

- (c) The wire gauge need not be shown as a part of the wire identification code if a note similar in content to the following appears on the Wiring Diagram:

NOTE: Unless otherwise specified all wires are 20 gauge.

- (d) When a suffix letter such as N indicating a ground wire is a part of the wire identification code, and the wire gauge is indicated by a note on the diagram, a dash shall be inserted before the suffix letter. Example: 3135-19A-N.

- (3) The first four digits of an assigned ATA system/sub-system/sub-sub-system number shall be used as a prefix to the wire number, for all wires, cables and coaxial cables as follows:

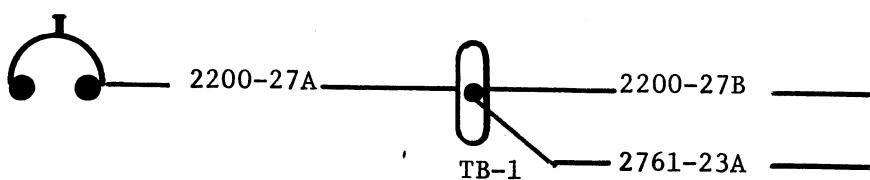
- (a) Sub-sub-system conductors having the same first four digit ATA number and sharing the same termination or connection, shall be identified with the common sub-sub-system number (2421.) (Ref. Fig. 1.)
- (b) Sub-sub-system conductors having the same first three digits of the ATA number and sharing the same termination or connection shall be identified with the common sub-system number (2420.) (Ref. Fig. 1.)

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- (c) Sub-system conductors having the same first two digits of the ATA number and sharing the same termination or connection shall be identified with the common system number (2300.) (Ref. Fig. 1.)
- (d) A conductor that has a common connection point with two or more systems shall be identified with the controlling ATA system identification. Example:

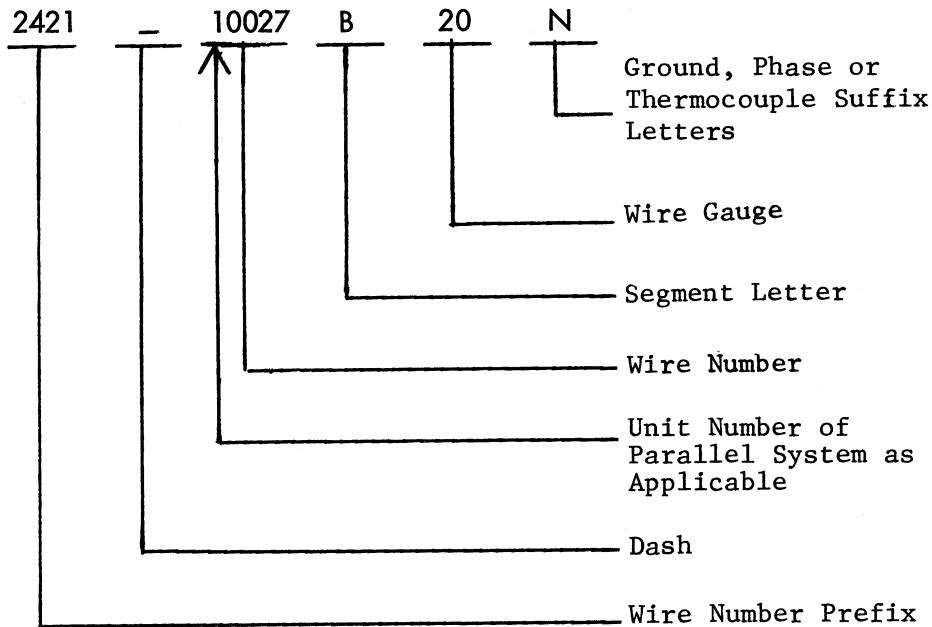


- (4) Spare unused wires shall be identified as follows:
 - (a) Unused spare wires that are required by a particular system/sub-system/sub-sub-system shall be identified with the applicable complete wire identification code for that system/sub-system/sub-sub-system.
 - (b) Unused wire (required for "spares provisions") shall be identified with the miscellaneous system 99 number followed by a two-digit number assigned by the manufacturer.
- (5) A wire number consisting of a maximum of four digits (except for parallel systems) shall be used to differentiate between wires, cables, or coaxial cables in a particular sub-sub-system. See paragraph (d) following for parallel system numbering.
 - (a) A different number shall be used for each conductor not sharing a common terminal or connection. (Ref. Fig. 1.)
 - (b) Wires with the same four digit ATA number and sharing a common terminal connection or junction shall have the same number, but different segment letters.
 - (c) Where practicable, numbers shall be assigned in numerical sequence beginning with the lowest number.
 - (d) Parallel systems shall be identified with a five digit wire number. The first digit shall indicate the specific parallel system unit identification number such as No. 1 AC Generation System. Example:

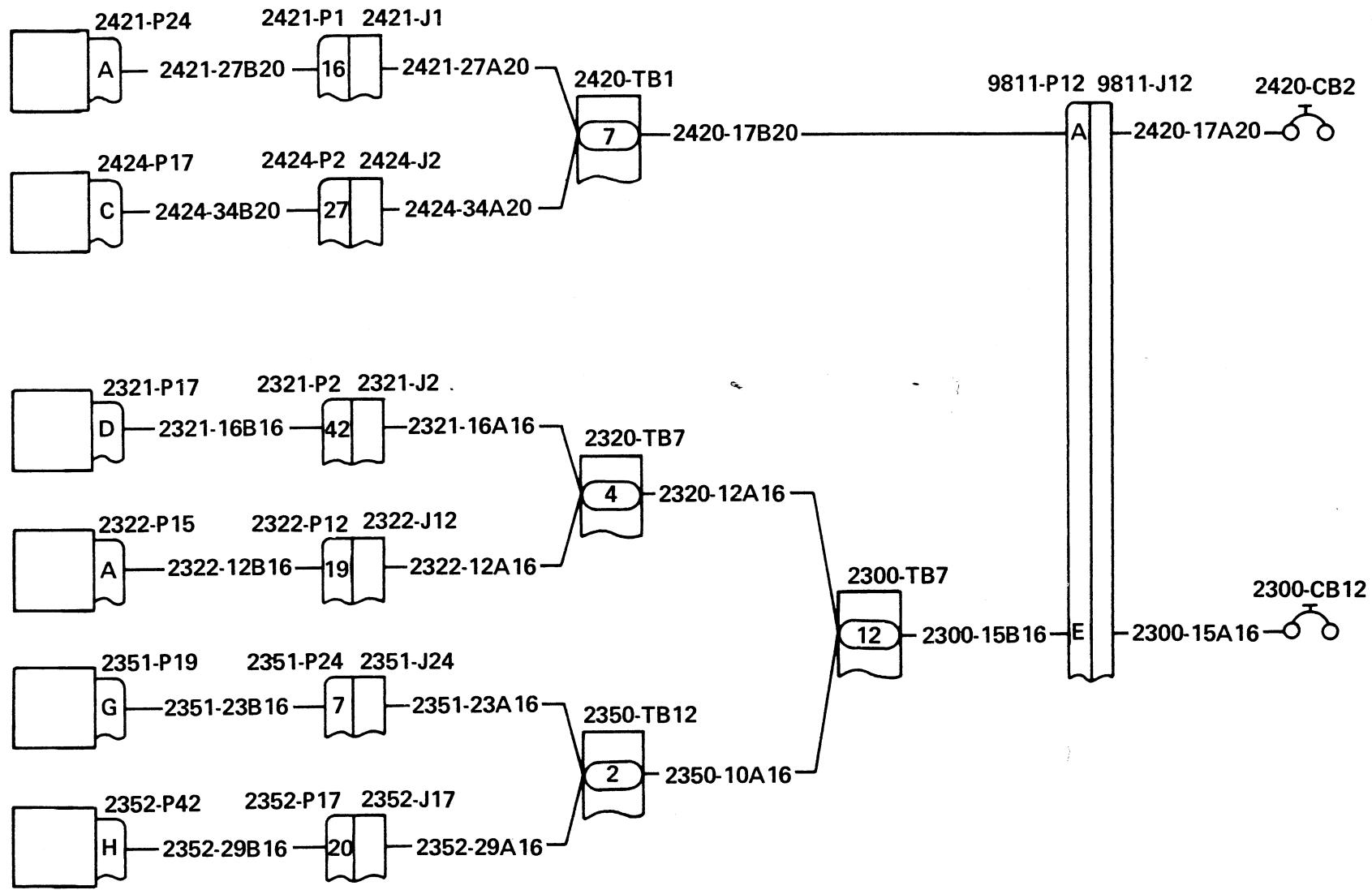
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- (e) Wire numbers 9000-9999 (to which airlines may add any specific parallel system unit identification if required) shall be reserved for airline use and shall not appear on wire numbers assigned by manufacturer, i.e., 2421-19101 A 22.
- (f) In order to facilitate interchangeability requirements, identical wiring such as would appear in the power plant may have identical wire identification.
- (6) Wire segments (conductor between two terminals or connections) shall be identified as follows:
 - (a) A letter shall be used to differentiate between conductor segments in a particular circuit. (Same four digit ATA system/sub-system/sub-sub-system number, i.e., 2421.)
 - (b) A different letter shall be used for each segment sharing a common terminal or connection, and having the same four digit ATA number.
 - (c) Where practicable, segments shall be lettered in alphabetical sequence and the letter "A" shall identify the first segment starting at the signal and/or power source.
 - (d) The letters "I" and "O" shall not be used as segment letters. Double letters "AA", "AB", "AC", ..., "BA", "BB", "BC", ..., etc., shall be used when more than 24 segments are required.

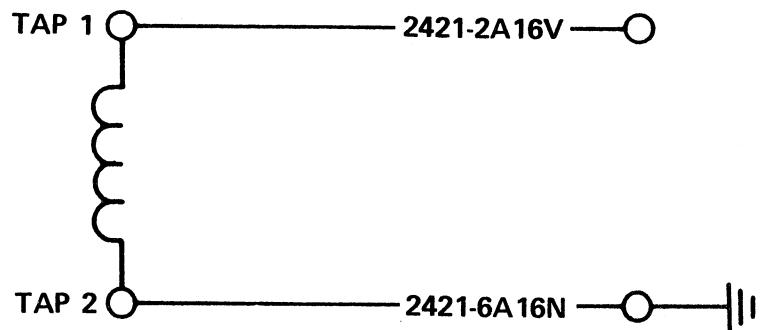


Sample Illustration - Wire Identification
Figure 1

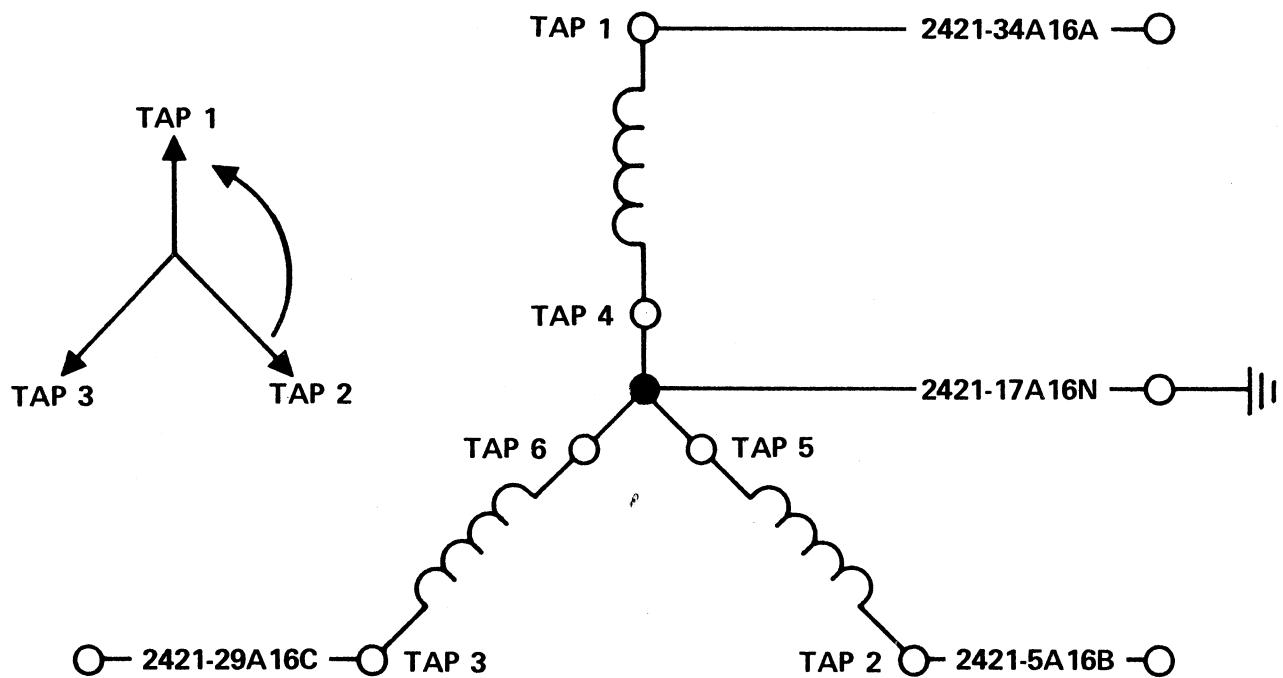
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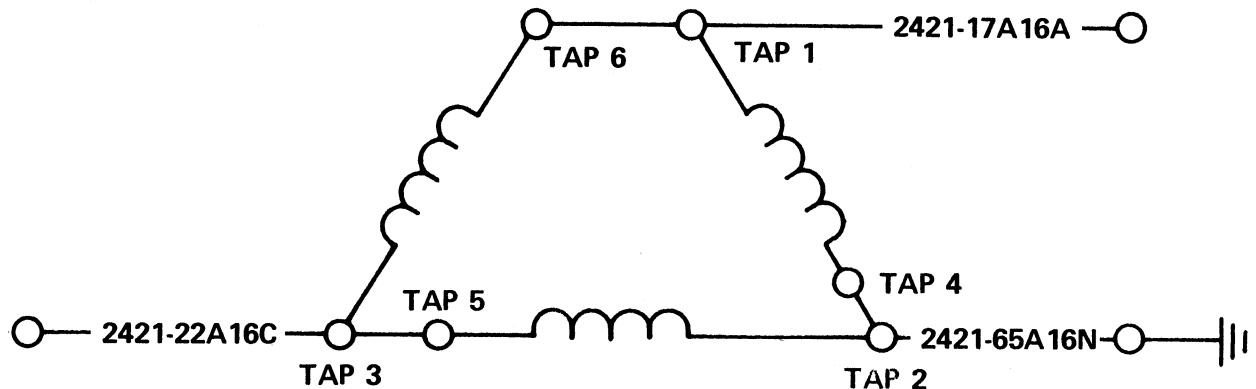
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SINGLE PHASE SYSTEM



THREE-PHASE "Y" SYSTEM



THREE-PHASE DELTA SYSTEM

Wiring Phase as Applied to AC Power Wiring
Figure 2

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- (e) Segments joined by a permanent splice shall have different segment letters assigned.
- (7) The wire or cable size (gauge) number shall be used to identify the American Wire Gauge (AWG) size of the wire or cable.
 - (a) For coaxial cables and thermocouple wires, the wire size number shall not be included.
 - (b) For thermocouple wires, a dash (-) shall be used in lieu of the wire size number. (Ref. Paragraph 10.)
- (8) Ground Wires shall be identified as follows:
 - (a) The letter "N" (ground) shall be used as a suffix to the wire identification code, to identify a segment of a wire or cable that is a part of the ground network.
 - (b) All wires that have the capability of being connected to the ground network of the Aircraft Electrical System without causing malfunctioning of any circuit shall be identified with the suffix letter "N."
 - (c) Critical and sensitive electronic systems which have interconnecting "Ground" leads, but only one segment actually grounded to structure, only the segment actually grounded to structure shall be identified with the "N" suffix.
- (9) AC Phase Carrying Wire shall be identified as follows:
 - (a) The phase letters "A", "B", and "C" shall be used as a suffix to the wire or cable identification code on all wire segments carrying three-phase AC power from the source of power up to and including the aircraft item using the three-phase AC power.
 - 1) The letters "A", "B", and "C" shall indicate the phase sequence corresponding to Tap 1, Tap 2, and Tap 3, respectively. (Ref. Fig. 2.)
 - 2) In a three-phase grounded delta system, Tap 2 shall be considered as corresponding to the grounded phase. (Ref. Fig. 2.)
 - 3) Examples of wire identification coding, as applied to AC power wiring, are illustrated in Fig. 2.
 - (b) The phase letter "V" shall be used as a suffix to the identification code to identify all segments of the high voltage (40 volts or higher) side of a single phase AC power circuit. (Ref. Fig. 2.)
- (10) Thermocouple Wires shall be identified as follows:
 - (a) The following suffixes shall be used as applicable: CHROM - CHROMEL, IRON - IRON, ALML - ALUMEL, COP - COPPER, CONST - CONSTANTAN.

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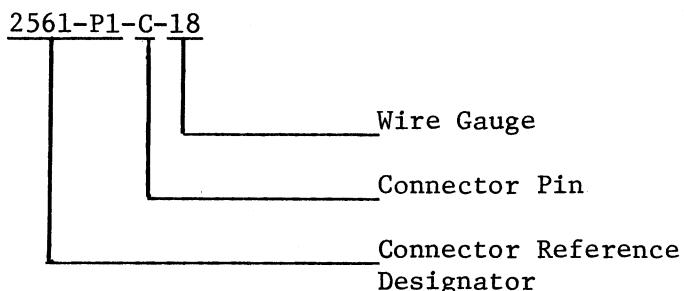
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

(11) Aluminum wire shall be identified as follows:

(a) The word ALUMINUM or ALUM shall be added as a suffix to the identification code, i.e., 2451 - 15 A 2 ALUM.

(12) Pigtail Spare Wires shall be identified on wiring diagrams and charts as follows:

(a) Wires installed in a pin (Pigtail Spare) of a connector, such as "POTTED" connectors, and are dead ended, shall be identified by the complete connector reference designator, pin designation, and wire size (i.e., 2561-P1-C-18, 2410-P1-AA-20, 2421-P2-BA-16, and 2131-P3-2-22.) Example:



C. Marking of Wire

- (1) The characters shall be of sufficient size to be legible, and of a permanent nature. The marking shall provide suitable contrast.
- (2) The method of identification shall not impair the characteristics of the wire or cable.
- (3) Each wire, cable and coaxial cable, is recommended to be identified at not more than 15- inch intervals throughout its entire length. Additions and exceptions to these requirements are:
 - (a) Wires and cables shall also be identified within 3 inches of each junction (except permanent splices) at each terminating point.
 - (b) As a maintenance objective, marking shall be so located that shielding, ties, clamps, or supporting devices need not be removed in order to read the identification.
 - (c) Marking shall be accomplished by imprinting on the wire, cable or non-metallic sleeve.
 - (d) Wires, Cables and Coaxial cables, upon which imprinted identification cannot be affixed, shall be identified as follows:

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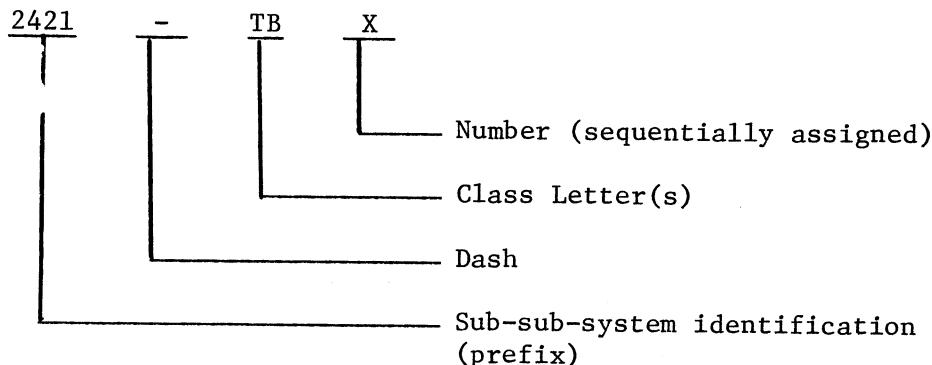
- 1) The identification code of each conductor (and color, where applicable) shall be placed on a nonmetallic sleeve external to the outer covering.
- (e) Short wires less than three (3) inches in length such as jumpers whose termination points are visible without disassembly or cutting of spot ties, need not be marked on the wire. However, they shall be completely identified on the wiring diagram.

D. Assignment of Reference Designators

- (1) USAS Y32.16 Class letters and marking requirements shall be utilized as a minimum standard.
 - (a) The following class letters will be used to supplement Y32.16 when a more definite designator is required.

<u>Class Letter</u>	<u>Description</u>
FR	Ferrule
SP	Splice
FT	Feed-Thru
JB	Junction Box
PL	Panel
GS	Ground Stud
PT	Pigtail
M	Module Code (Identification used to identify integrated circuits)
EC	End Cap

- (2) Reference Designators shall consist of the first four digits of an ATA number (dash symbol not required between first and second element numbers) followed by a dash, class letter(s) and a sequentially assigned number. Example:



- (3) The complete reference designator shall be assigned and indicated adjacent to each unit/part/component.
- (4) The prefix to each reference designator need not be shown on the diagrams if a note similar in content to the following appears on the diagram.

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NOTE: Unless otherwise specified, prefix all reference designators with ATA system/sub-system/sub-sub-system numbering, i.e., 2421.

- (5) Application of Reference Designators for system/sub-system/sub-sub-system shall be assigned in relation to the following:
- (a) An item that is shared by conductors having the same first four digit ATA number shall be identified with the common sub-sub-system number (XX21.)
 - (b) An item that is shared by conductors having the first three digits of an ATA number (XX21, XX22) shall be identified with common sub-system number (XX20.)
 - (c) An item that is shared by conductors having the same first two digits of an ATA number (XX20, XX30) shall be identified with the common system number (XX00.)
 - (d) The following are exceptions to the basic concept:
 - 1) Unit/Part Reference Designators (including mating connectors) shall be assigned in relation to the system and equipment identification number. Example:

The manufacturer may have assigned an ATA number of 24-21-06 in the maintenance manual to the Generator Control Unit. However, the generator control unit will be identified on the wiring diagram with a reference designator such as 2421-GX and the Mating Component (such as a plug) shall be identified with a reference description such as 2421-PX. (Ref. paragraph (2)).
 - 2) The prefix for a relay Reference Designator shall be established by the applicable four digit ATA system/sub-system/sub-sub-system number that controls the coil (by power or signal source.)
- (6) Those items such as connector plugs, terminal board, etc., through which wires run and/or have terminals for two or more systems/sub-systems/sub-sub-systems shall be identified with the sub-sub-system breakdown of the miscellaneous system reference designator as applicable, i.e., 9811 except as shown in paragraph (b) and (c).
- (7) Reference Designators once assigned shall not be reidentified because of additions to the unit/part/component by other systems/sub-systems/sub-sub-systems.

E. Electrical and Electronic Schematics

- (1) Schematics shall be drawn for all complex systems as a specific

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aid designed for trouble shooting of the system. Requirements are as follows:

- | (a) Where practical, the layout of the schematic shall be as close as possible in relation to the location of the components in the aircraft.
- | (b) Where practical, the arrangement shall be viewed from the bottom of the page in which case the left margin shall correspond to forward on the aircraft. However, where clarity and ease of reading can be increased by deviating from such layout, such deviation shall be made.
- | (c) Units shall be identified by name.
- | (d) Wire numbers shall not be shown.
- | (e) Points of connection, such as pin numbers or letters at connector plugs, relay or switch contacts, shall be identified. However, such construction breaks as terminal boards, pressure seals, etc., need not be shown unless they contribute to the clarity of the diagram.
- | (f) Where applicable, circuit function and operation criteria such as switch and relay position and/or function shall be indicated adjacent to each component or contact point.
- | (g) Where applicable, electrical characteristics, ratings, type, value, range or scale indications shall be shown adjacent to the graphic symbol.
- | (h) Components, such as relays, switches, transformers, etc., not shown in their entirety on the diagram shall contain cross reference to related system/sub-system/sub-sub-system ATA number to the other diagram or diagrams that show the remaining connections.
- | (i) Power sources shall be shown as complete as possible. In the event this is impracticable, the abbreviated power source details shall be drawn and cross reference by ATA system/sub-system/sub-sub-system number added to the other diagram that shows the complete power source details.
- | (j) The complete reference designator shall be indicated adjacent to each unit/part/component. The prefix to each reference designator need not be shown on the diagram, if a note similar in content to the following appears on the diagram:

NOTE: Unless otherwise specified, prefix all reference designators with ATA system/sub-system/sub-sub-system number, i.e., 2421.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

F. Detailed Logic Diagrams

- (1) Detailed Logic Diagrams shall be prepared for all systems and components which consist of logic, or two-state, devices. The diagram shall be drawn to progress from left to right and from top to bottom on the page. Signal qualities such as amplitude, polarity and sequence shall be shown. Connections at the devices shall be identified and unit specifications shall be included. The symbols used in logic diagrams shall be in accordance with ASA Standard Y32.14.
- (2) Either the uniform shaped or the distinctive shaped symbols may be used but no combination of the two types of symbols shall be used in one diagram. A designation on the diagram shall be made to identify whether positive, negative, or mixed logic is used. In case of complex signal combinations, a truth table shall be included in the diagram to aid in explaining outputs from various combinations of inputs.
- (3) Logic functions for which no logic symbols are specified, may be depicted by rectangles provided they are properly labeled to denote their function.

G. Electrical and Electronic Charts

- (1) Charts listing wire numbers opposite pin numbers shall be printed for each major disconnect point such as wing/fuselage breaks, engine firewalls, and the main instrument and radio control panels. All pins shall be identified whether used or not. Unconnected pins shall be identified as "unused." Example:

<u>Pin Number</u>	<u>Wire Number</u>
1	3132-61 F 22
2 Unused	
3	9915-16 C 22 (Spare)
4	3311-23 H 20 N
5	3132-211 G 22 (Spare)

- (2) Conduit charts shall be prepared giving point to point routing, with the conduit nominal diameter, and listing all wires by number, which are routed internal to the conduits.
- (3) Location charts shall be prepared showing the location of all electrical and electronic components or groups of components. These locations shall be identified by illustration of aircraft references such as structural and station references. The components thus illustrated shall include such items as antennas, terminal strips or other production breaks, panels, junction boxes, equipment racks, etc.

2-2-2

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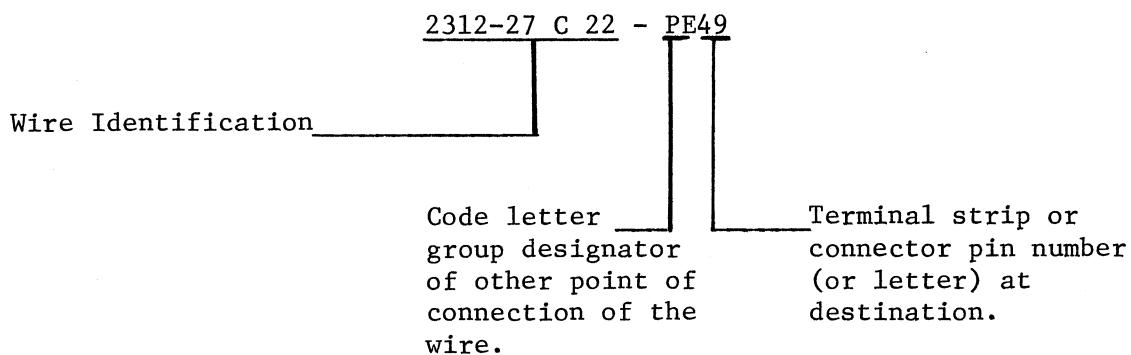
AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

- (4) Charts of all principal junction boxes shall be printed showing all the electrical components located therein, including terminal strips, ground points and disconnects; and displaying these in their proper physical relationship - one to the other. The junction box and each item of electrical equipment shall be identified by description, location and item designator.
- (5) Complete routing and termination details shall be provided for all wires installed in the airplane. This shall consist of the wire number, gauge, length, type of material, to-from routing, effectivity and the wiring diagram on which it is shown.
- (6) Complete routing and termination details shall be drawn for "SPARE" or unused wires as follows: spare wire charts shall be prepared listing wire number or wire color identification, routing, and termination details, except that spare wires shall be drawn on a single wiring diagram page when they are part of a cable which is shown in entirely as a part of the wiring on that page.

H. Alternate Presentation - Electrical and Electronic Wiring Diagrams
(Designator Type Drawings)

- (1) Where agreed upon by the parties concerned, the following practices may be used for all or certain wiring diagrams:
 - (a) Lines indicating cables or wires shall not be used.
 - (b) Each connector, terminal strip, or other termination point for wires shall be identified on the diagram by a large size code letter or code letter group. At each point of connection of a wire, there shall be shown the complete wire number and a designator consisting of the code letter group and the terminal stud or disconnect pin number of the other point of connection. Terminal strips or disconnects shall be drawn arranged so that stud or pin numbers progress arithmetically or alphabetically.
 - (c) The following is the recommended form of display of wire number and designator on the diagram:



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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

NOTE: This specification does not affect the marking of wires installed on the aircraft. The wire marking shall, of course, continue to show at least the airframe manufacturer's complete wire number and, in addition, any other markings which are normally employed by the airframe manufacturer. Wires shall not be marked with a destination designator or pin number.

- (d) Major equipment items shall be identified by the manufacturer's model or type number. This information can be included in the equipment lists instead of on the drawing.
- (e) All provisions of the Electrical and Electronic Wiring Diagrams shall apply to the alternate presentation except the requirements for showing wire connections between terminals and disconnect points.

I. Electrical and Electronic Symbols

- (1) The electrical and electronic symbols illustrated in this section shall be used for wiring and schematic diagrams prepared under this specification.
- (2) Additional symbols may be derived by combining elements of existing symbols illustrated in this section. Any symbol thus derived constitutes an approved symbol. A symbol thus constructed shall be representative of the unit it depicts and shall be basic in design with no attempts made to illustrate parts irrelevant to the electrical operation of the unit.

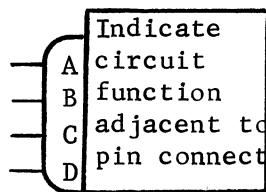
2-2-2

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

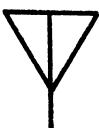
AMPLIFIER



General

NOTE: Triangle is pointed in direction of transmission.

ANTENNA



General

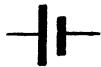
NOTE: Type and/or function may be indicated by words or abbreviations adjacent to the symbol.

ARRESTER (Lightning)



General

BATTERIES



One Cell



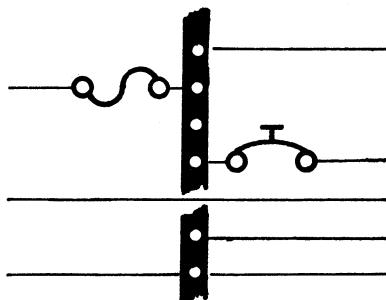
Multicell

BELL



General

BUS



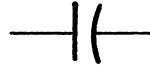
Bus bar with connections. Break bus where conductor crossing is required.

BUZZER



General

CAPACITORS



General



Variable Capacitor

Curved element shall represent the outside electrode in fixed paper- and ceramic-dielectric capacitors, the negative electrode in electrolytic capacitors, the moving element in variable and the low potential element in feed-through capacitors.

CIRCUIT BREAKERS



Switch Type



Push Type



Push-Pull Type

NOTE: Rating should be noted adjacent to symbol.

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

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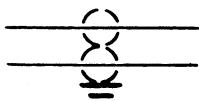
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

CONDUCTORS

General



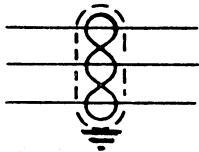
Shielded Conductor



Shielded Double Conductor



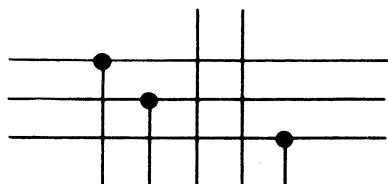
Shielded & Twisted Double Conductor



Shielded & Twisted Triple Conductor



Coaxial Conductor
General



Conductors - crossings and junctions of conductors. The dot at the intersection indicates a joining of conductors.

CONNECTIONS

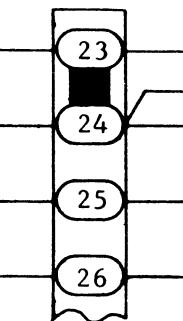
Soldered, swaged or crimped connection.



Screw or Stud Connection



Terminal Strip Connection



Buildup example: Terminal strip.
Broken line is used to designate that only a portion is shown.

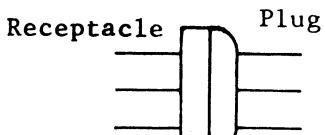


Unterminated wire with end insulated.



Slipring Connection

CONNECTORS



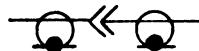
General

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

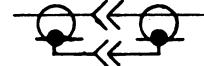
AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

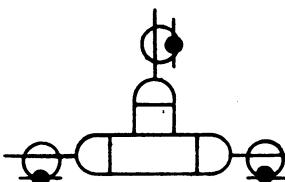
CONNECTORS (continued)



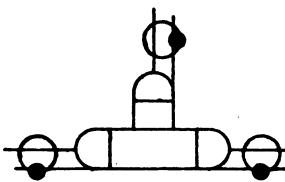
Coaxial Connector. Outside Conductor not carried through.



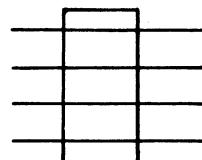
Coaxial Connector. Outside conductor carried through.



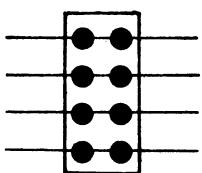
Tee-connector (coaxial) outside conductor not carried through.



Tee-connector (coaxial) outside conductor carried through

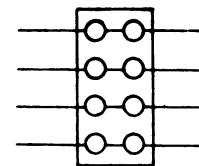


Pressure Seal Feed-Through



Pressure Seal Connector. Double soldered, swaged or crimped.

CONNECTORS (continued)



Pressure Seal Connector.
Double Screws or Studs.



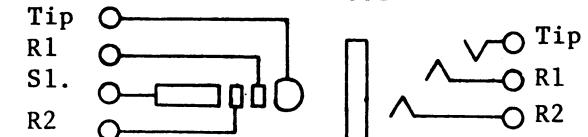
Permanent Splice



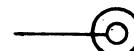
Phone Plug & Receptacle (Jack)
Two Conductor



Phone Plug & Receptacle (Jack)
Three Conductor



Phone Plug & Receptacle (Jack)
Four Conductor



Pin Jack or Test Jack

FUSE (and Current Limiter)



General

NOTE: Rating shall be noted adjacent to symbol.

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are center in both columns.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

GENERAL SYMBOLS

-
Negative Polarity

+\n+
Positive Polarity

∅\n∅\n∅
Phase

~\n~\n~\nAlternating Current or
Frequency

Ω\nΩ
Ohm or Resistance

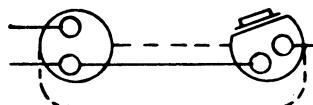
/|\n/\n/\nChassis or Frame Connection
not necessarily at ground
potential.

||\n||\n||\nGround connection or circuit
ground with ground potential.

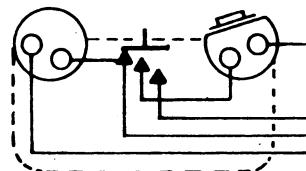
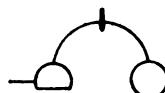
||\n||\n||\n*\n*Number inside △\nrefers to footnote
which indicates
ground location.

"Floating" Ground used to show
that ground is located at point
referenced in flag note.

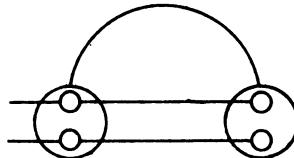
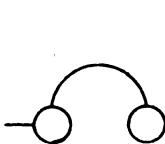
HANDSETS



Handset Three-Conductor



Handset Four-Conductor With
Push-to-talk switch

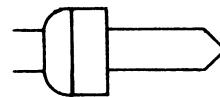


General

HEATERS

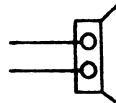


Heater Element General



Special Application
Pitot Heater

HORN



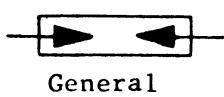
Horn, Howler and Loud
Speaker

Symbols for schematic diagrams appear at the left, those for wiring diagrams
at the right, and those symbols suitable for both are centered in both columns.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

IGNITOR



General

INDUCTION COILS



Induction Coil with Air Core



Adjustable Induction Coil With Air Core



Tapped Induction Coil



Induction Coil with Metal Core

LAMPS



General

Illuminating (Preferred)



General Illuminating
(alternate)



Jeweled Indicator or Warning Light

LAMPS (continued)



Jeweled Indicator or Warning Light
With Push-To-Test Feature.

Letter inside symbol denotes
color of cap.

A=Amber

B=Blue

G=Green

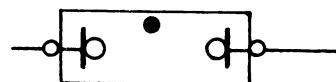
R=Red



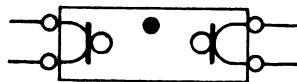
Glow Lamp, cold cathode,
gas-filled, a.c. type.



Glow Lamp, cold cathode,
gas-filled, d.c. type.

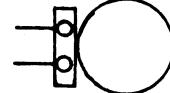


Fluorescent lamp, two terminal.



Fluorescent lamp, four terminal.

MACHINES (motors, generators)



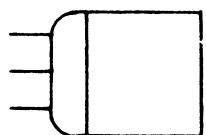
Motor or Generator - Basic
OR

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

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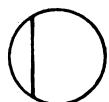
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MACHINES (motors, generators) (continued)



Case grounding and terminal identification shall be shown.

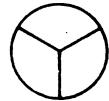
Connections to following motor/generator symbols not shown for convenience.



Single Phase



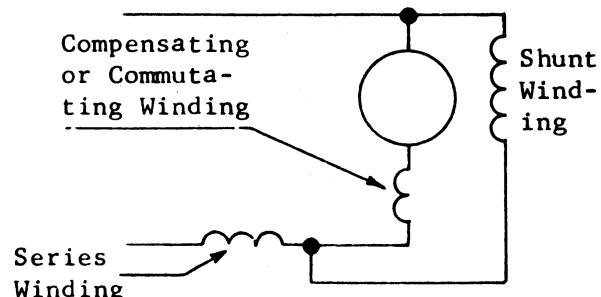
Double Phase



Three Phase Wye (ungrounded)



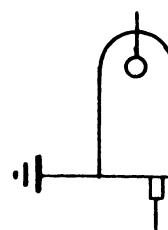
Three Phase Delta



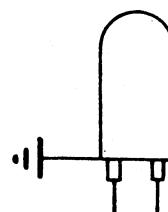
Buildup Example: Compound Generator or Motor

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

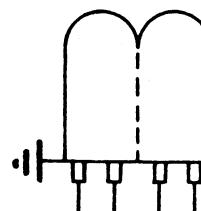
MAGNETOS



Single Magneto



Two low tension terminals, case grounded



Four low tension terminals, case grounded

Buildup example: Dual magneto

MAGNET



Permanent Magnet

METERS (INDICATORS)



Basic, two terminal

V=Voltmeter
A=Ammeter

G=Galvanometer
F=Frequencymeter



Basic, three terminal

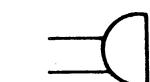
VA=Volt Ammeter
VAR=Volt Amperes Reactive

W=Wattmeter

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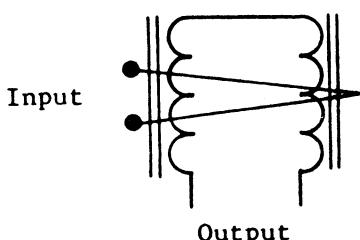
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MICROPHONE

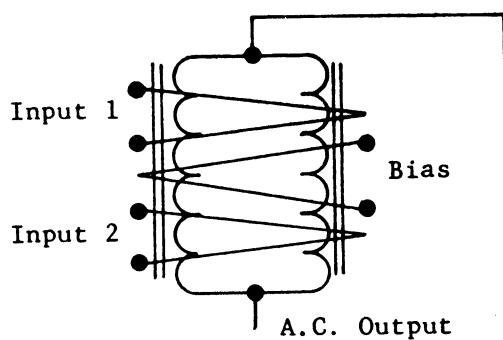


General

REACTORS (Magnetic Amplifiers)



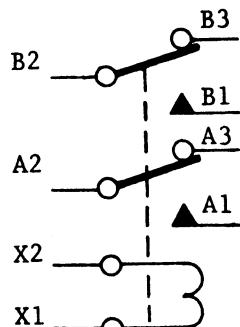
Saturable Core Reactor



Saturable Core Reactor

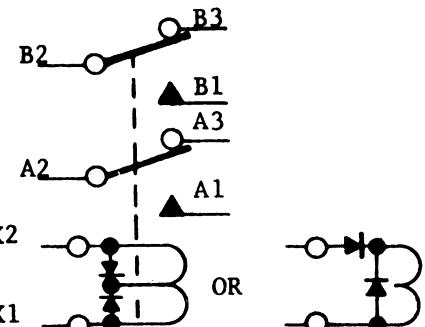
RECTIFIERS, See Transistors

RELAYS

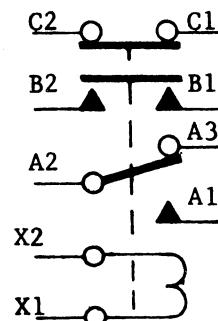


Double Pole, Double Throw.
Terminals to be labelled as shown.

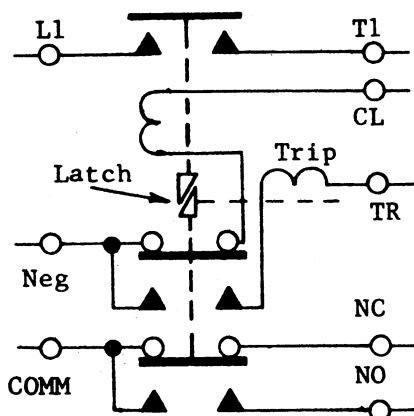
RELAYS (Continued)



Double Pole, Double Throw, A.C.
operated relay.



Double Pole, Double Throw with
auxiliary contacts. Terminals
to be labelled as shown.



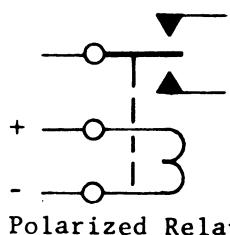
Buildup example: Latching Relay

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

RELAYS (Continued)



RESISTORS



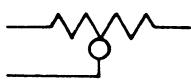
General Fixed Resistor. Value may be shown inside symbol.



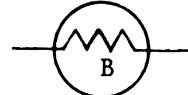
Variable Resistor. Value may be shown inside symbol.



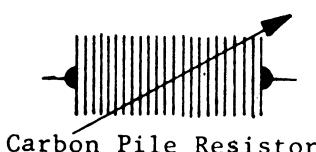
Variable Resistor with OFF position



Tapped Resistor

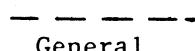


Thermal Resistor or Ballast lamp.



Carbon Pile Resistor

SHIELDING (Also See Conductors)



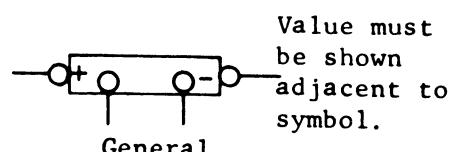
General



Shielded Box

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

SHUNT



Value must be shown adjacent to symbol.
General

SWITCHES



Single Pole, Single Throw (Make)



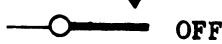
Single Pole, Single Throw (Momentary Make)



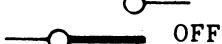
Single Pole, Double Throw (Make)



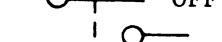
Single Pole, Double Throw With One Side Momentary Make



Single Pole, Double Throw. Both Sides Momentary Make, Center OFF.



Single Pole, Double Throw, Center OFF (Make)

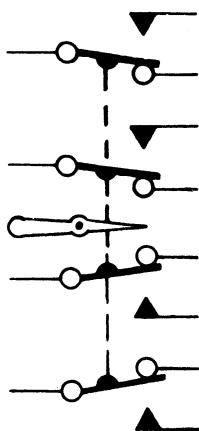


Buildup example: Double Pole, Double Throw, With Center OFF position

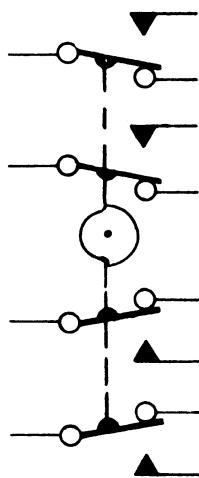
AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SWITCHES (Continued)



Four Pole, Double Throw, with Center ON position and Momentarily ON at Both Extremes, Toggle Actuated.



Four Pole, Double Throw, With Center ON Position and Momentarily ON at Both Extremes, Cam Actuated.

NOTE: Contacts shall be labelled as appropriate for identification.

Half circle at switch bar indicates direction of actuation.

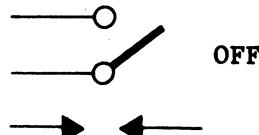
Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

Electrical and Electronic Symbols
Figure 9

SWITCHES (Continued)



Four Position Switch



Four Position Switch with 2 Momentary Contacts



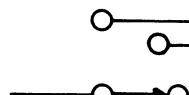
Normally Closed Push Type Switch (Break)



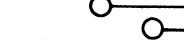
Normally Open Push Type Switch (Make)



* Push-On, Push-Off Switch



Rotary selector switch (Break before make)



Buildup of a two wafer rotary selector switch (Make before break)

2-2-2

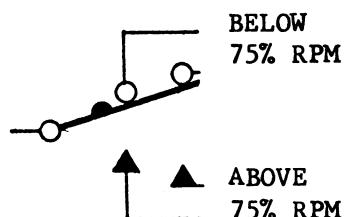
AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SWITCHES (continued)

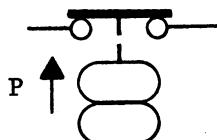


Mechanically actuated switch

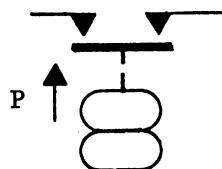


Buildup example: Throttle actuated switch, 5 contacts. Half circle indicates direction of actuation.

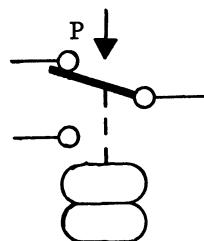
Additional explanatory notes may be added adjacent to terminals.



Pressure operated normally closed switch.



Pressure operated normally open sw.



Pressure Operated Switch

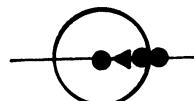
SWITCHES (continued)

NOTE: The arrow indicates the direction of switch bar movement when pressure is applied.

Pressure settings at which actuated may be shown adjacent to symbol but are not part thereof.



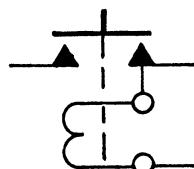
Centrifugal Switch
(Shown in Open Position)



Centrifugal Switch
(Shown in Closed Position)



Inertia Switch - General
Force required to operate the switch shall be shown adjacent to symbol.



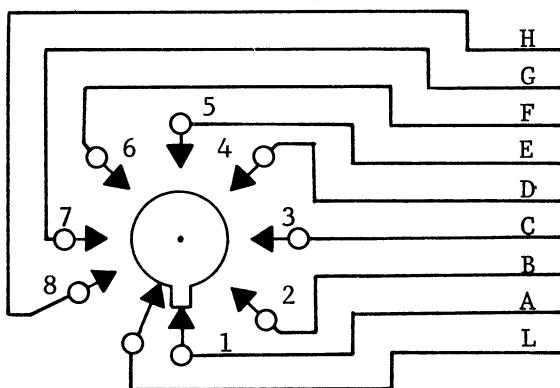
Buildup Example
Magnetically held push-type switch

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SWITCHES (continued)

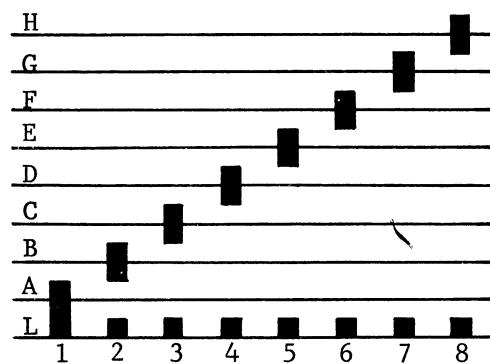


Wafer Switch - Buildup Example

1 - Pole, 1 - Circuit, Non-shorting
Contacts.

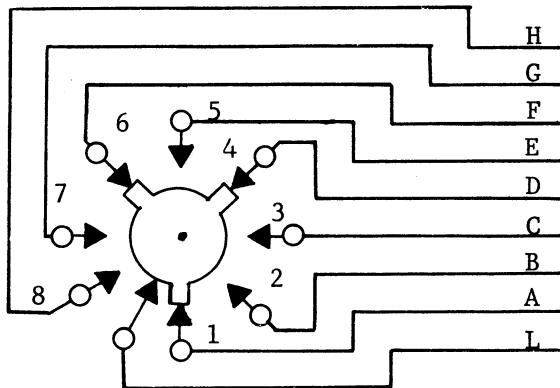
One Common Wire

SWITCHES (continued)



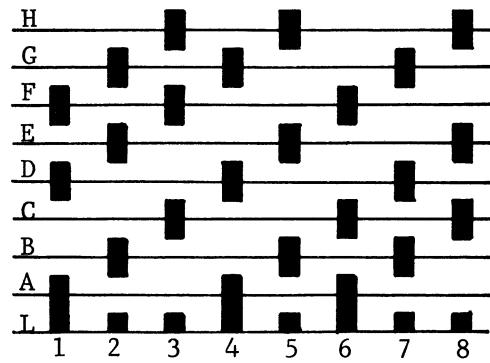
The "L" wire is common.

Continuity is indicated by a
black block across the wires.
Example: In position 4, wires
L and D are connected.



Wafer Switch - Buildup Example

3- Pole, 1 - Circuit, Non-shorting
Contacts.



The "L" wire is common.

Continuity is indicated by a
black block across the wires.
Switch positions are indicated
by the numbers in the bottom
row.

Symbols for schematic diagrams appear in the left-hand column; those suitable for wiring diagrams and schematics are shown in the right-hand column.

Electrical and Electronic Symbols
Figure 11

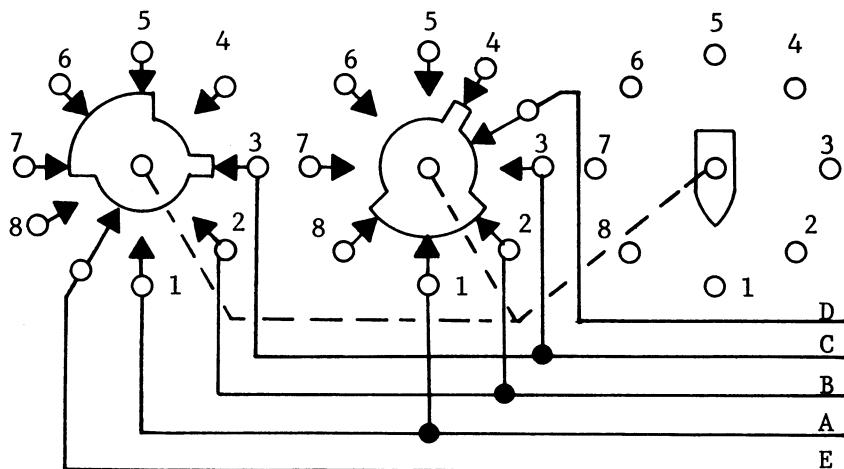
2-2-2

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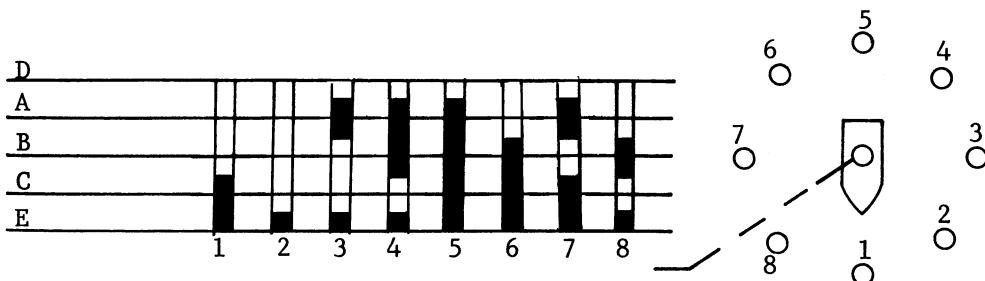
SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SWITCHES (continued)



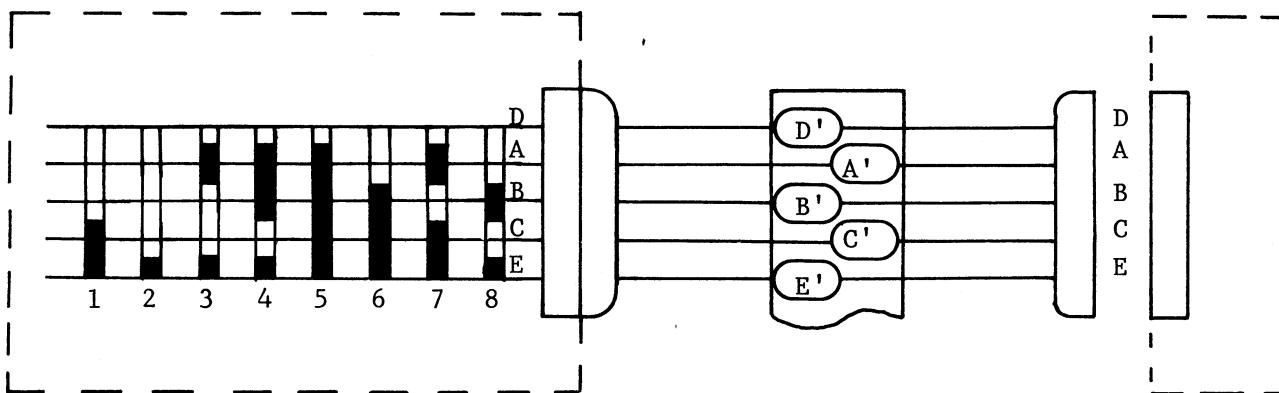
Wafer Switch - Buildup Example

Arrangement with two common wires. (Wires D and E)



Continuity between common wire E and related wires is shown by black blocks, continuity between common wire D and related wires is shown by white blocks across the wires.

Example: In position 4, common wire E is connected to A and B and common D is connected to C.



Buildup example of the same switch arrangement shown in a simple circuit. Continuity is the same as illustrated above.

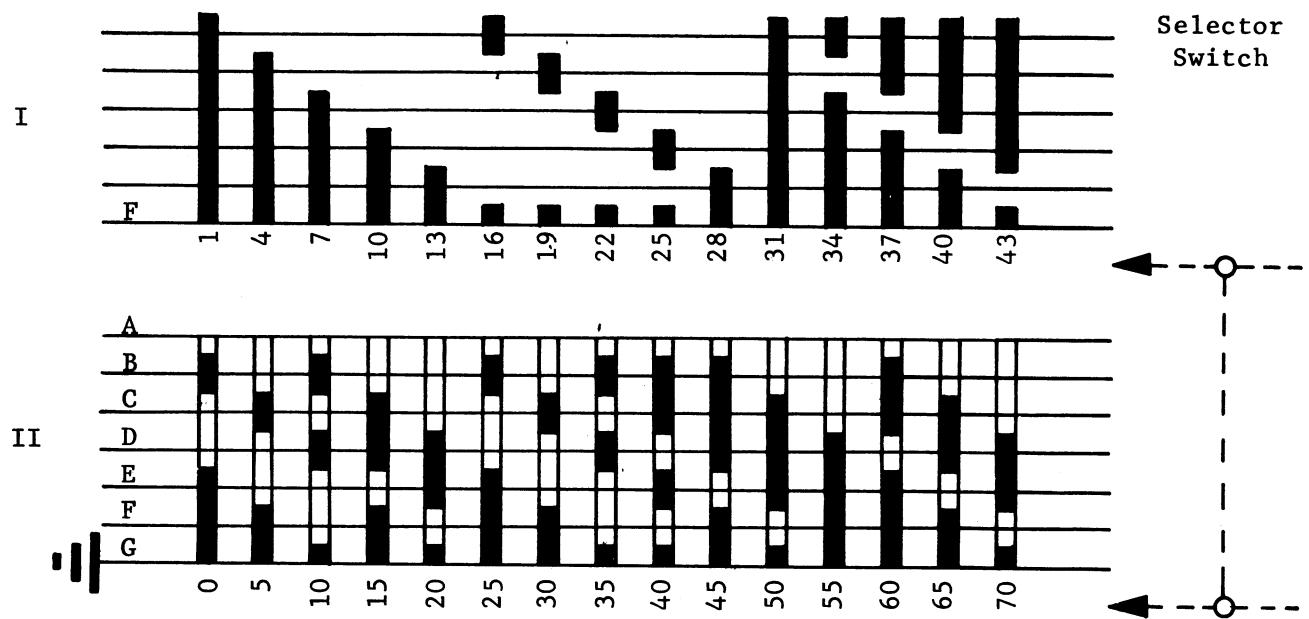
Electrical and Electronic Symbols
Figure 12

2-2-2

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SWITCHES (continued)



Buildup example of two wafers linked together. Wafer I has one common wire (F). Wafer II has common wires A and G.

Continuity is shown by black or white blocks across the wires.

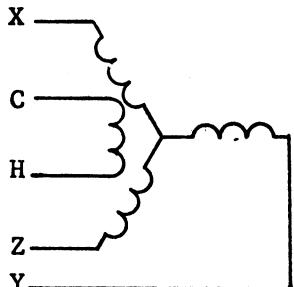
Electrical and Electronic Symbols
Figure 13

2-2-2

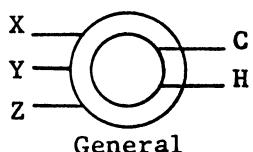
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

SYNCHRO



OR



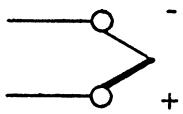
THERMAL DEVICES



Normally open temperature actuated switch



Normally closed temperature actuated switch

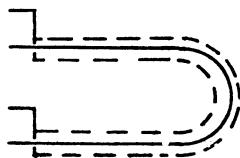


Thermocouple

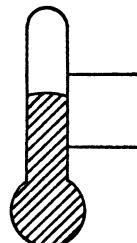


Temperature Bulb
General

THERMAL DEVICES (continued)



Temperature sensor
Continuous loop detector



Mercury temperature switch.
Control winding may be added
at base by showing contacts
for such winding



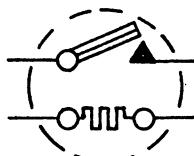
Thermostat with normally
closed contacts (break)



Thermostat with normally
open contacts (make)



Thermistor



Thermal Relay with Normally
Open Contact

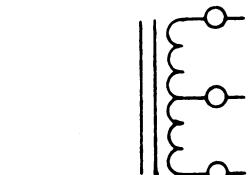
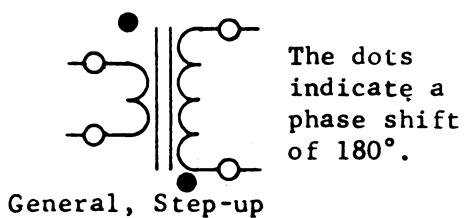
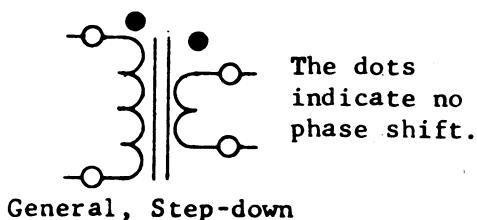
Time delay in seconds shall be
noted adjacent to symbol.

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

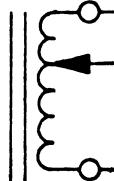
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

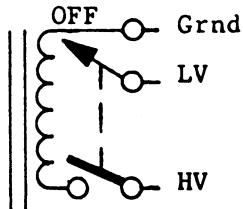
TRANSFORMERS



Auto Transformer



Variable Transformer

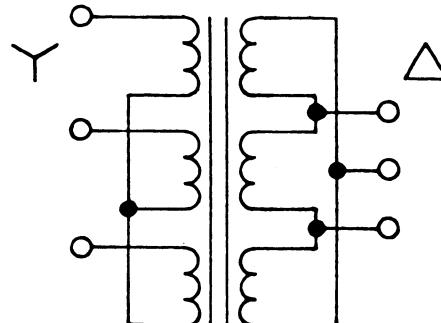


Buildup Example: Variable Transformer with Switch at OFF Position.

NOTE: Terminals shall be identified and voltages noted adjacent to connections for all transformers.

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols for both are centered in both columns.

TRANSFORMERS (continued)



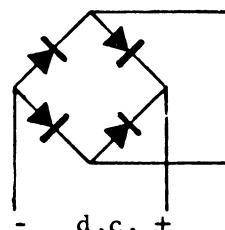
Polyphase Transformer
Y-Δ Connection shown (ungrounded)

TRANSISTORS



Diode, also used for half wave and blocking rectifier.

NOTE: Arrow shows direction of conventional current flow, electron flow is opposite to direction of arrow.



Full Wave Rectifier (Bridge)



Zener Diode

NOTE: The normal regulating voltage shall be shown adjacent to the zener diode. The arrow points in the direction of regulating electron flow.

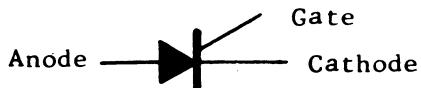


Symmetrical Zener Diode (Voltage limiter diode - Bi-directional).

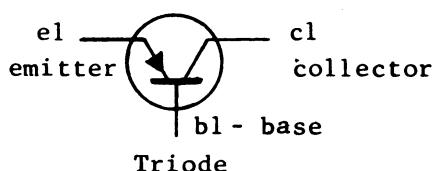
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

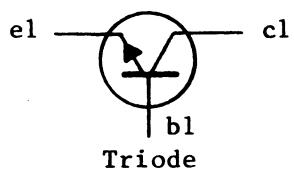
TRANSISTORS (continued)



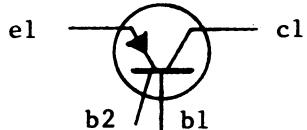
Silicon Controlled Rectifier.
Ampere rating shall be shown adjacent to symbol.



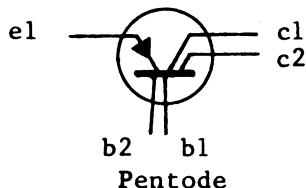
N or PNP type. Arrow on emitter indicates direction of current flow



P, NPN or NPNP type

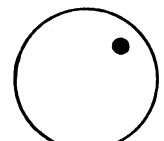


Tetrode



PN Unijunction or double base diode.

TUBES, Electron

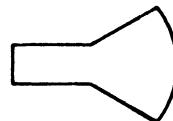


The dot may be located as convenient.

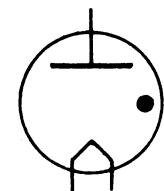
Envelope
The dot denotes gas-filled



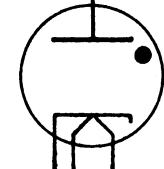
Split envelope for multi-purpose tubes



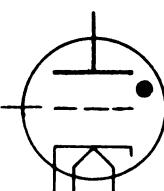
Envelope for Cathode Ray Tube



Diode with directly heated filamentary cathode



Diode with indirectly heated cathode



Triode with indirectly heated cathode

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

Electrical and Electronic Symbols

Figure 16

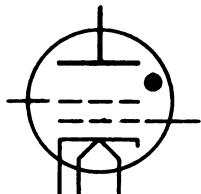
2-2-2

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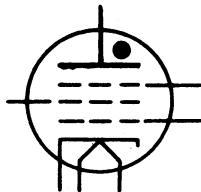
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

TUBES, ELECTRON (continued)

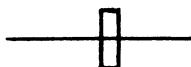


Tetrode with indirectly heated cathode



Pentode with indirectly heated cathode

WAVE GUIDES



Rectangular



Ridged

UNIT, PIEZOELECTRIC CRYSTAL

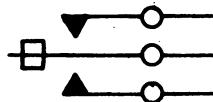


OR



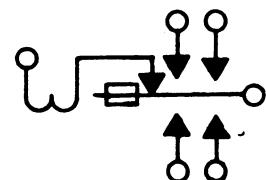
General

VIBRATOR



Basic

Buildup
Example



Vibrator with Separate Drive

Symbols for schematic diagrams appear at the left, those for wiring diagrams at the right, and those symbols suitable for both are centered in both columns.

Electrical and Electronic Symbols
Figure 17

2-2-2

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Structural Repair Manual

POLICY

The manufacturer's Structural Repair Manual shall contain descriptive information and specific instructions and data pertaining to the repair of the primary and secondary structure adaptable to field repair.

Repairs shall be based upon the designed stress application with normal margin of safety similar to requirements for original construction.

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Page 1
May 15/59

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

APPLICATION OF STANDARDS

1. Format and Illustration Standards

All provisions of Chapter 1 of this specification apply to the Structural Repair Manual except coverage shall be limited to those chapters shown in Section 1-3-2, Figure 3.

2. Application of Standard Numbering System

A three element numbering system shall be used in the Structural Repair Manual. This system is described in 1-3-1 of this specification. Each breakout shall begin with page 1.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

PRESENTATION

1. Text: Text shall be minimized; repair illustrations shall be self-explanatory. Repair instructions may be covered adequately by tabular data and typical repair illustrations as follows:

Skin repairs for given thickness skin and particular location may indicate rivet size and spacing for patch or splice. Typical illustrations of flush patches, lap patches and skin splices may be used.

Stringer repairs for given type stringer and particular location may indicate rivet size and number of rivets required on each side of break for a splice, and the splice material, whether nested or applied back to back.

Rib repairs may indicate for a given thickness of rib the rivet size and spacing for a patch or splice.

Allowable damage to spar caps and longerons may be covered in tabular form showing maximum amount of material removed at various locations.

2. Illustrations: Illustrations shall be adequate to depict the repair. It is desired that details of materials, dimensions, drill sizes, fastener sizes and types be called out on the illustration. Illustrations of the airframe structure shall be provided to show locations by stations identifying materials of construction. Extent of damage considered allowable and not requiring repair (after clean-up or stop drilling) shall be defined. Extent of damage requiring patching and parts replacement shall also be defined.
3. Manual Content: This manual shall include the following types of coverage:

STRUCTURES GENERAL

Zoning, Access Door and Panel Identification and Location Diagrams in conformity with 1-6 of this specification

All Material Which Pertains to the Aircraft as a Whole
Standard Practices Applicable to Structural Repair

General Repair Procedures

Sheet Metal Types, Materials, Thicknesses

Extrusion Types, Materials, Dimensions

Rivet Types, Materials, Sizes

NOTE: The sheet metal, extrusion and rivet data shall be a listing of material used in original construction and, where possible, permissible substitutes. Locations where this material may be used shall not be shown in the Aircraft General section.

Alignment Check Procedures

Detailed damage classification charts which shall include maximum stress limitations

Charts showing material specifications, harness, tensile strength, bending radii, etc.

Riveting charts showing spacing, size, locations, etc.

2-3-2

AIR TRANSPORT ASSOCIATION

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

NOTE: Specific repairs and replacements for areas which the manufacturer's stress analysis show to be more critical than other areas, shall be shown in the specific Chapters 52 through 57.

DOORS	Procedures, processes and limitations pertaining to the structure of specific doors. Includes items such as typical damage repairs, critical area limitation repairs or replacements and alignments. Also includes repair procedures for entrance stairs.
FUSELAGE	Procedures, processes and limitations pertaining to the fuselage structure. Includes the main frame, secondary structure, exterior covering, fairings, fittings, etc. Also includes the door attachments and doublers surrounding openings.
NACELLES/PYLVONS	Procedures, processes and limitations pertaining to the nacelles/pylons and their attachment to the wing or fuselage. Includes those fittings attached to the wing or fuselage which are used to mount or support the power plant or rotor assembly. Also includes firewalls which are attached to the structure.
STABILIZERS	Procedures, processes and limitations pertaining to the horizontal or vertical stabilizers, rudder and elevators. Does not include fillets which are covered in Chapter 53.
WINDOWS	Procedures, processes and limitations pertaining to the pane and allowable limits of all windows including the windshields and cockpit windows. Also includes observation and navigation transparent openings.
WINGS	Procedures, processes and limitations pertaining to the wing and its components such as ailerons, tabs, flaps, spoilers, etc. Also includes balancing of controls.

AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Illustrated Parts Catalog

Policy

The Illustrated Parts Catalog is intended for use in the identification and requisition of replaceable aircraft parts and units. It is a companion document to the Maintenance Manual and shall contain all parts information for which Maintenance Practices coverage has been provided. It also shall contain all those individual parts, such as seals, bearings, screens, filters, electrical connectors, pulleys, fittings, brackets, external lines, etc., where optimum maintenance practices dictate replacement of these parts, instead of changing the overhaulable assemblies. If the manufacturer intends that a specific part be locally manufactured from raw (bulk) stock such as cut lengths of conduit, bonded braid, upholstery cloth, gasket material, rubber extrusion, etc., the part number shall be listed and material specification and significant dimensions shall be given in the nomenclature column.

Illustrated Parts Catalogs prepared by airframe manufacturers shall be "Customized" in accordance with the provisions of 2-4-2 of this specification.

NOTE: The term "Customized" denotes a catalog which contains Detailed Parts List and Numerical Index information applicable to a particular customer only. Illustrations shall be customized only to the extent necessary for clarity.

Manufacturers preparing Overhaul Manuals shall normally provide illustrated parts lists as a portion of those manuals in accordance with the provisions of 2-5-2 of this specification, except that manufacturers of large and complicated units and assemblies may elect to provide a separate Illustrated Parts Catalog in accordance with the provisions of 2-5-2 and 2-4-2 of this specification.

For overhaulable units and assemblies, designed by both the airframe manufacturers and others, the illustrated parts list of the Overhaul Manual shall not be repeated in the Illustrated Parts Catalog. The Illustrated Parts Catalog shall list only the part number of the complete assembly, its attaching parts, and its maintenance spares as defined above.



AIR TRANSPORT ASSOCIATION OF AMERICA

SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Application of Standards

1. Format and Illustration Standards

Except as specified herein all provisions of Chapter 1 of this specification apply to the Illustrated Parts Catalog.

Page layout margin limitation (Ref. 1-1-1) may be reduced to 1" clear at bottom.

2. Application of Standard Numbering System

Except as specified herein, the standard numbering system (Ref. 1-3-0) shall apply to this publication. Each second element (sub or sub-sub system) break-out (as envisioned in this specification) shall have a section title page and shall be numbered in the following arrangement on a right hand page:

Example: 27-11-00
 Section Title
 Page 1

The reverse side of the section title page may be used for an illustration if an illustration (figure) is required at the sub or sub-sub system level. In such case the first illustration (Figure 1) page shall be numbered page 0. Subsequent pages for that figure and for subsequent figures (Figure 2, etc.) within the same sub or sub-sub system breakout shall be numbered consecutively beginning with page 1 (see Note). If the last text page of the preceding figure is a right hand page, the new illustration (figure) may be placed on the reverse side. If the last text page of the preceding figure is a left hand page, the new illustration (figure) may be placed on the reverse side of a blank right hand page.

Where an illustration is the first page in a third element (unit/subject) breakout, the reverse side of the illustration page shall be either 1) the last text page of the preceding figure or 2) a blank right hand page if the last text page of the preceding figure is a left hand page. The illustration page will be page number 0. Subsequent pages for that figure and for subsequent figures (Figure 2, etc.) within the same unit/subject breakout shall be numbered consecutively beginning with page 1 (see Note). If the last text page of the preceding figure is a right hand page the new illustration (figure) may be placed on the reverse side. If the last text page of the preceding figure is a left hand page, the new illustration (figure) may be placed on the reverse side of a blank right hand page.

NOTE: To show configuration effectivity differences between blocks of airplanes a given customer's catalog could conceivably have gaps in figure number sequence within the same sub or sub-sub system or unit/subject breakout (i.e. 27-11-01 Fig. 1 and Fig. 4). Page numbers however shall run in a consecutive number sequence within the same sub or sub-sub system or unit/subject breakout regardless of gaps in the figure number sequence. For example, the first page of 27-11-01, Figure 4 would continue in consecutive page number sequence after the last page of 27-11-01, Figure 1. If the last page of 27-11-01, Figure 1 were page 3, the first page of 27-11-01, Figure 4 would be page 4.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

PRINTED PRESENTATION

1. Catalog Content: The Illustrated Parts Catalog shall consist of the following:

A. Introduction

Shall include:

A statement of the purpose of the catalog.

An explanation of how to use the catalog.

An explanation of the model/series/type number of the aircraft or engine covered by the catalog.

An explanation of the "Effectivity" code employed in the catalog plus a listing of the manufacturer's serial numbers related to those (tail number, registration number, etc.) assigned by the operator to his aircraft.

An explanation of the general system of assembly order.

An explanation of the part numbering system used by the manufacturer and, if a block system of numbering is used, a chart of the block assignment numbering shall be shown.

A listing of manufacturers' names, addresses and codes as used in the catalog. (The introduction shall contain a list of names and addresses of all vendors supplying items or articles not carried under the manufacturer's part number, together with his code. Vendor's code shall be in accordance with the current issue of Federal Supply Code for Manufacturers, Cataloging Handbook H4-1, and shall be preceded by the capital letter "V".

B. Numerical Index (Ref. Fig. 1 of this section)

The numerical Index shall be a complete listing of all parts included in the Detailed Parts List and will show in reverse as well as forward, all information relative to superseded parts. Different part numbers shall not be assigned to identical parts, nor shall identical part numbers be assigned to different parts. This listing shall include both the original manufacturer's and airframe or engine manufacturer's part number. Vendor's part numbers listed shall cross-reference airframe or engine manufacturer's numbers where applicable.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

**MANUFACTURERS' MASTHEAD
ILLUSTRATED PARTS CATALOG**

PART NUMBER	AIRLINE PART NUMBER	CH-SECT-UNIT-FIG-ITEM			TTL. REQ.
2753849-1		78-31-01-	1	10	4
2753851-1		78-31-01-	2	70	8
		78-31-01-	1	15	4
		78-31-01-	2	65	8
2754076-1		27-51-02-	1	255	6
2754192-1		27-51-01-	1	185	1
2754216-12400		25-51-01-	1	170	1
2754216-4000		25-51-01-	1	175	1
2754216-4624		25-51-01-	1	180	1
2754216-5700		25-51-01-	1	190	2
2754216-5854		25-51-01-	1	195	2
2754216-6525		25-51-01-	1	210	1
2754216-8000		25-51-01-	1	215	1
		25-51-01-	1	200	1
		25-51-01-	1	205	1
		25-51-01-	1	220	1
		25-51-01-	1	225	2
2754223-1700					AR
2754223-2600					AR
2754433-1		24-21-02-	1	105	2
2754434-1		24-21-02-	1	100	4
2754491-1		78-31-08-	1	25	4
2754502-1		26-11-01-	1	50	32
2754514-12		26-11-01-	1	150	20
SUPERSEDED BY 2754514-14		27-51-01-	1	80	2
2754514-14		27-52-01-	1	20	2
SUPERSEDES 2754514-12		27-51-01-	1	80	2
2754514-501		27-51-01-	2	75	2
2754574-1724					AR
2754574-1816					AR
2754574-1824					AR
2754575-5924					AR
2754581-1		29-11-20-	1	355	1
2754663-1		54-31-01-	1	25	8
2754856-1		78-11-01-	1	9	1
2754883-1		71-11-01-	1	535	4
2754890-1		78-31-01-	1	215	4
2754898-1		32-71-01-	1	390	1
2754967-1		25-58-01-	1	20	2
2755-1		27-41-01-	1	195	1
SEE 7765422-501					
2755026-1		27-41-01-	1	-230	1
		27-41-01-	1	-265	1
2755192-1		25-28-01-	1	290	84
2755253-1		27-21-01-	1	85	1
		53-13-01-	1	130	1

-ITEM NOT ILLUSTRATED

NUMERICAL INDEX
NUMERIC - PAGE 7
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Sample Page - Illustrated Parts Catalog
Numerical Index

Figure 1

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Part number arrangement shall begin at the extreme left-hand position and shall continue from left to right, one position at a time, until all parts are arranged in sequence. The order of precedence in beginning the part number arrangement at the extreme left-hand (first) position of the part number is as follows:

Letters A through Z
Numerals 0 through 9

The Alpha "0" shall be considered as numeric "zero".

Example of proper Part Number Arrangement:

ABCO158
AN509-10
AN509C10R7
A39539-10-001*
ZB45-37C*
10-60732-3
10001
11
112304
5008CW*
65-2716-27
6553

*NOTE: Ref. 2-4-3, page 1, "Use of Special Characters"

Requirements shall be listed as total per entry in the Detailed Parts List.

Standard items of a hardware nature, such as nuts, bolts, screws, fasteners, rivets, washers, which are normally used in hundreds of different locations on the aircraft shall be listed with approximate totals per aircraft or "AR" (as required) with no reference to figure or item number.

Each part number shall be followed by the applicable locator (Chapter, Section, Unit, Figure and Item number) references, except as indicated for standard items above.

The order and headings of the various columns shall be as shown in Fig. 1 of this section.

Drawing numbers, together with any applicable spaces, dashes, dash numbers or suffix letters, shall agree with part numbers.

It is desirable to subdivide the Index for ease of revision and locating part numbers. The minimum breakout shall be the separation of the alpha part numbers from the numeric part numbers. Each breakout shall be identified and shall begin with page 1. The following examples illustrate typical pagination.

Numerical Index
Alpha - Page 1
Date

Numerical Index
Numeric -Page 1
Date

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C. Detailed Parts List (Ref. Fig. 2 of this section)

(1) General Information

The Detailed Parts List shall be composed of chapters following the same sequence and including all material as provided in Chapter 1, ARRANGEMENT OF MATERIAL (Ref. 1-2-0) of this specification except where obviously not appropriate.

f

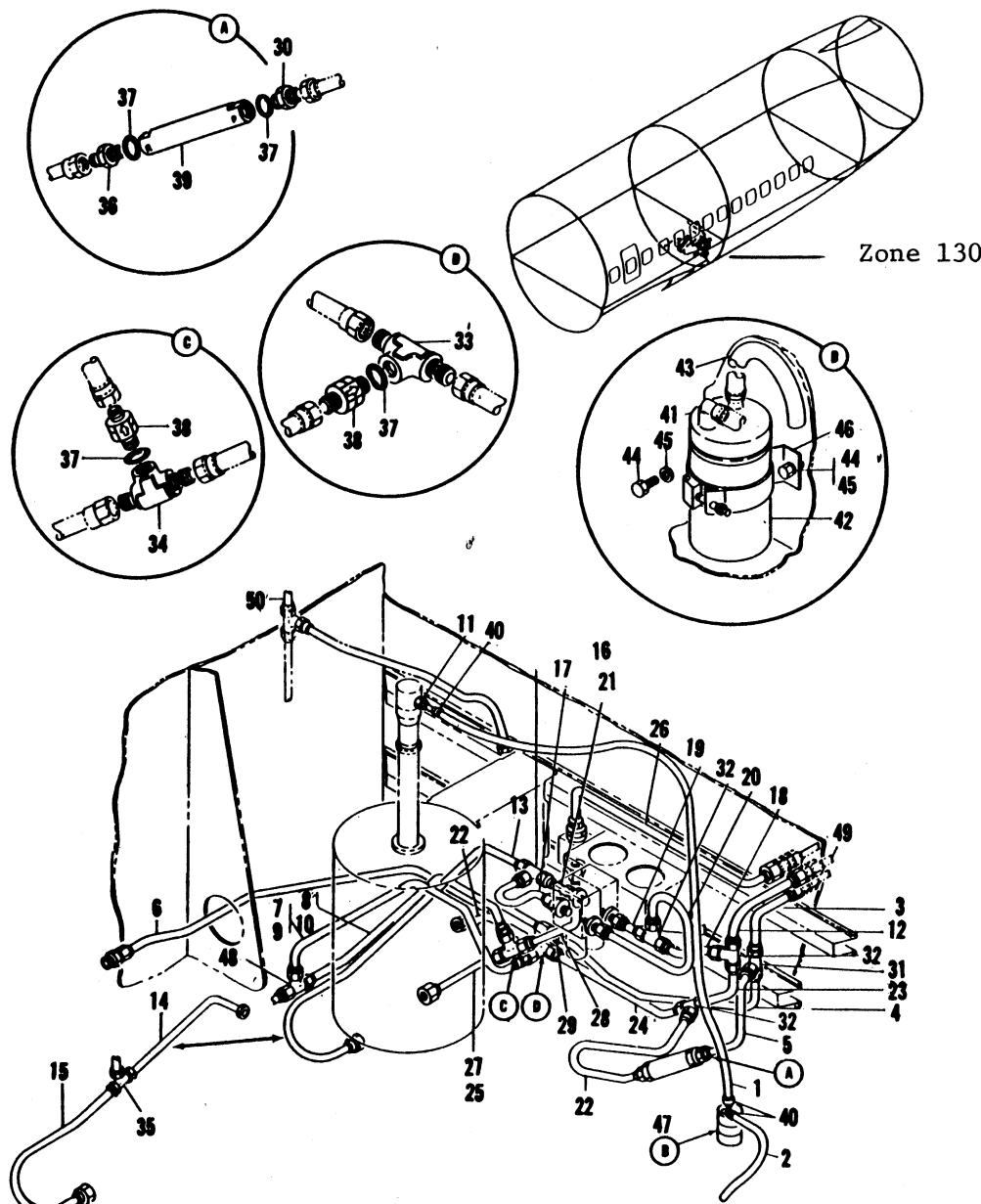
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURERS' MASTHEAD

ILLUSTRATED PARTS CATALOG



29-11-07

**Pressure and Return Hydraulic Piping,
Left Hand - Wheel Well Sta. 642**

Page 0
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**Sample Page - Illustrated Parts Catalog
Exploded View
Figure 2**

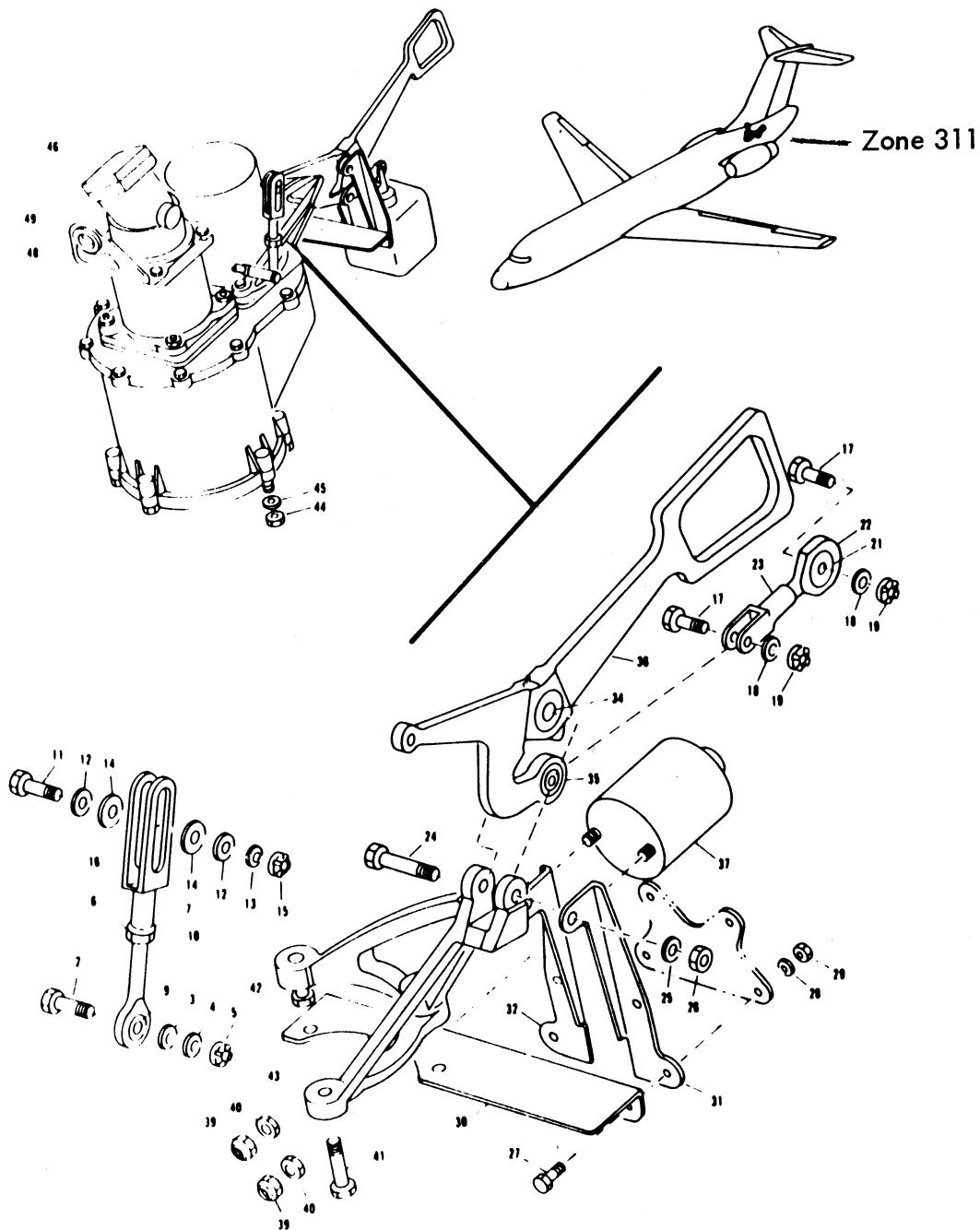
2-4-2
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURER'S
MASTHEAD

ILLUSTRATED PARTS CATALOG



Drive Mechanism Installation - Horizontal Stabilizer
Figure 1

27-41-01

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURER'S MASTHEAD					
MANUAL TITLE					
FIG. ITEM	PART NUMBER	NOMENCLATURE	EFFECT FROM TO	UNITS PER ASSY	
1 - 1	5647880-1	DRIVE MECHANISM INSTAL-HOR STAB (SEE 27-40-00 FIG. 1 FOR NHA)		(RF)	
2	NAS1104-10D	.BOLT		1	
3	2715111-1	.BUSHING-CLAMP UP		1	
4	2704013-4166	.WASHER		1	
5	(AN320-4)	.NUT		1	
6	NAS309-4	.WASHER		1	
7	NAS513-4	.END ASSY-MOTOR VALVE PUSH ROD		1	
8	2711474-1	.BEARING-(V70417) (SIZE ID .3755 / .3765 ON INSTAL)		1	
9	(AA509-12)	.END		1	
10	2711474-3	.BOLT		1	
11	NAS1104-11D		001005	R	REF 2-4-2 PARA. C(1)
11A	NAS1104-12D	.BOLT	007999	R	
12	2711495-1	.SPACER-MOTOR VALVE PUSH ROD	006006	R	
13	2704015-416L	.WASHER		AR	REF 2-4-2 PARA. C(8)
14	124682-4-10-3	.WASHER		2	
15	AN320-4	.NUT		1	
16	2711473-1	.END-MOTOR VALVE PUSH ROD	001005	2	REF 2-4-2 PARA. C(8)
17	NAS1104-7D	.BOLT	006999	2	
17A	NAS1104-8D	.BOLT		2	
18	2704013-416L	.WASHER		2	
19	AN320-4	.NUT		2	
20	2711450-501	.END ASSY-SWITCH PUSH ROD (UP)	001001	1	REF 1-1-1 PARA. 7
20A		.END ASSY-SWITCH PUSH ROD (LWR)	002999	1	
21	AN201KP4A	.BEARING-(SB 55-7)	001001	1	
21A	AN200KP4A	.BEARING	002999	1	
22	2711450-3	.END (ALTERED FROM NAS37)	001001	1	
23	2711451-1	.END-SWITCH PUSH ROD	002999	1	
23A	2711451-501	.END-SWITCH PUSH ROD		R	REF 2-4-2 PARA. 7
24	NAS1104-20D	.BOLT		R	
25	2704013-416L	.WASHER		R	
26	AN320-4	.NUT		R	
27	AN3-4A	.BOLT		R	
28	2704013-10L	.WASHER		R	
29	NAS679A3	.NUT		R	
30	4711498-1	.ANGLE-SWITCH SUPPORT		R	
31	4711499-1	.ANGLE-SWITCH VERTICAL SUPPORT (LH)		R	REF 2-4-2 PARA. C(5)
32	4711499-2	.ANGLE-SWITCH VERTICAL SUPPORT (RH)		R	
33	3711454-1	.LEVER ASSY-TRAVEL STOP		R	
34	AN207DPP4	.BEARING		R	REF 2-4-2 PARA. C(1)
35	AN201KP4A	.BEARING		R	
36	3711454-3	.LEVER		R	
37	31440	RECTIFIER-DC POWER SUPPLY (CRANDALL CORP) -P		R	
38		ATTACHING PARTS		R	
39	NAS1021D3	.NUT		R	
40	AN960D10	.WASHER		R	
41	AN3-27A	---		R	
42	AN5-25A	---		R	
43	3644373-1	.BOLT		R	
44	NAS1322N5	.BOLT		R	
45	2704013-516L	.BRACKET-HYD LEVER TRAVEL STOP		R	
46	3717263-501	.NUT		R	
47		.WASHER		R	
48	3716315-1	.DRIVE UNIT-HOR STAB (SEE 27-40-10 FIG. 2 FOR DETAILS)		R	REF 2-4-2 PARA. C(1)
49	5647880-19	.SUPPORT ASSY-RUBSTRIP		R	REF 2-4-2 PARA. C(1)
		.GROMMET		R	REF 2-4-2 PARA. C(1)
- ITEM NOT ILLUSTRATED					

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Sample Page - Illustrated Parts Catalog
Detailed Parts List
Figure 4.

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The Detailed Parts List shall not list or illustrate parts which lose their identities by being permanently welded to other pieces, or rivets, cotter pins (split pins) and items made from raw (bulk) stocks, such as cut lengths of conduit, electric and locking wire, bonding braid, upholstery cloth, friction tape, etc., rubber extrusions excepted.

When the design or the material of a part has been changed and both parts are interchangeable and authorized for continued use, both part numbers shall be listed, with the new part shown as a variant item number. The original part shall be deleted when not authorized for continued use. When the original part is listed, the effectivity shall be shown in the "Effectivity" column.

When standard parts (such as MS, AN, NAS, NAF, etc.) are used, the standard part number shall be listed in the Part Number column.

Vendor items (excluding proprietary items), commercial equipment, and customer-furnished equipment shall be listed. In these cases, the original manufacturer's part number shall be shown in the Part Number column. The vendor's name or code shall be shown in the Nomenclature column together with the part number, if any, assigned by the manufacturer whose name appears on the masthead. Vendors' code shall be preceded by the capital letter "V".

If a vendor or commercial item is modified or reworked, the applicable part may be assigned an airframe or engine manufacturer's part number. A notation in parenthesis shall be placed immediately following the nomenclature stating that this part is "modified" (or selected) from Part Number _____ made by _____ (Manufacturer's code).

If two or more assemblies are made up of a large majority of identical parts, or the assemblies are mirror (reversed) images as in the case of left-hand and right-hand parts, they shall be listed together and the details combined. Detail not common to both assemblies shall be noted. Left-hand parts shall bear LH after their titles, right-hand, RH. If a part is used on one side of the aircraft only, or one assembly only, its title shall be followed by (LH side) or (RH side); however, the parts list shall contain both left- and right-hand part numbers.

Where applicable, service bulletin numbers shall be shown in the Nomenclature column, by means of the letters SB and the number. For example, (SB25-14).

Parts carrying vendor's numbers which are proprietary with the airframe or engine manufacturer shall be identified by the letter "P".

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

(2) Arrangement of Columns

The various columns on the Detailed Parts List page shall be arranged as follows:

Column -1-	Figure and Item Number
Column -2-	Part Number
Column -3-	Nomenclature
Column -4-	Effectivity
Column -5-	Units per Assembly

(3) Figure and Item Number

Each part numbered item listed in the Detailed Parts List shall be assigned an item number. The figure number to which the items pertain shall be shown adjacent and to the left of the first item number at the top of each page. Item numbers shall, where possible, begin at 1 for each illustration and may be broken in sequence for the insertion of additional items. Items listed but not illustrated shall be symbolically identified. (Ref. Fig. 2 of this section).

The use of consecutively assigned alpha variants (Ref. 2-4-3, page 5, Field 23) shall be applied when it is necessary to add additional figures to show modification or configuration differences from the original illustration.

The use of consecutively assigned alpha variants (Ref. 2-4-3, page 6, Field 27) shall be applied when it is necessary to add additional items to show modification or configuration differences from the original item callout.

A figure or item number (inclusive or exclusive of a variant) once assigned, shall not be changed.

(4) Part Number

Each listed part shall be assigned a part number by the manufacturer which is consistent with those provided in documents covered by ATA Spec 200.

(5) Nomenclature

Wording shall be arranged so that the identifying noun or key word shall always be the first part of the description. This shall be followed by the balance of the modifying words included in the drawing title description. Every attempt shall be made to limit the nomenclature to twenty seven digits. Standard abbreviations may be used as necessary.

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(6) Indenture

The Detailed Parts List breakdown furnished for the Illustrated Parts Catalog shall be indented or coded to indicate item relationship, as follows:

1234567
Installation
 Detail parts for installation
 Assembly
 Attaching Parts for assembly

 Detail parts for assembly
 Sub-assembly
 Attaching parts for sub-assembly

 Detail parts for sub-assembly
 Sub-sub-assembly
 Attaching parts for sub-sub-assembly

 Detail parts for sub-sub-assembly

Attaching parts shall be listed immediately beneath the assembly which they attach and preceding any detail parts of said assembly. They shall be listed in the same column as the assembly which they attach and shall be captioned "Attaching Parts". Some form of separation symbol such as the asterisk shown above shall follow the listing of attaching parts.

(7) Effectivity

(a) Effectivity shall indicate the applicability of parts to aircraft. This shall be a six-digit alpha or numeric code designating the letters or numbers by which the operator elects to identify his equipment, such as the last three digits of the registration number, the operator's assigned number, the manufacturer's serial number, etc.

Coding shall begin with the last three digits of the lowest assigned number to indicate first applicability and the last three digits of the highest assigned number to indicate last applicability of an unbroken sequence of assigned numbers. No dash shall be shown between numbers. When an item is applicable to all aircraft types covered by the catalog, the column shall be left blank.

For example, in a twenty aircraft fleet, aircraft assigned numbers 7001 through 7020, split effectivity would be shown as below. Part No. 123456 would be applicable to aircraft numbers 001 through 011, 013 and 014, 019 and 020. Part Number 123456-1 would be applicable to aircraft numbers 012, 015 through 018.

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Part No.	Nomenclature	Effect-From To
123456	Valve	001011 013014 019999
123456-1	Valve	012012 015018

(b) Engines

In showing effectiveness for engine parts, the legend method shall be used.

Letters shall be used in the Effectivity columns of the Detailed Parts List to represent a code. This code shall identify those parts which, in accordance with the manufacturer's records are to be used only under certain conditions.

A separate listing of all the codes used in an Illustrated Parts Catalog or an Illustrated Parts List shall be carried at the end of the Detailed Parts List under the heading "Usage Code List".

A partial example would be as follows:

Effectivity Code	Model Designation	Engine Application
BP	xxxx-1 xxxx-5 xxxx-7	Parts coded BP are interchangeable in complete sets with parts coded BD
BQ	xxxx-1 xxxx-5 xxxx-7	Parts coded BQ are interchangeable in complete sets with parts coded BR.

(8) Units per Assembly

This column shall contain the number of units required per assembly, per sub-assembly and per sub-sub-assembly as applicable. If more than one assembly is required, the total of such assemblies shall be inserted. For bulk items, the letters "AR" shall be inserted in the quantity column to indicate "as required". Where items are listed for reference purposes, "RF" shall be inserted.

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(9) Illustrations (Ref. Figs. 2 and 3 of this section)

A view of each system, sub-system, sub-sub-system and unit or assembly, exploded as necessary to show parts thereof, shall be provided to illustrate each part included in the Detailed Parts List. Illustration of parts shall be technically correct in their assembly/disassembly relationship. Location of the illustrated assembly as related to the complete airframe or engine shall be indicated by a location sketch which also shows the zone number Ref. 1-6 of this specification.

An assembly or grouping of parts or sub-assemblies that can readily be identified by a single illustration and further identified with a sub- or a sub-sub-system may be considered a unit and qualify for third element breakout. For example, Pressure and Return Hydraulic Piping, LH-Wheel Well - Sta. 642 (Ref. Fig. 2).

When impractical to completely explode on one illustration all the detail parts of each sub-assembly contained in any one assembly or unit, a sub-assembly may be illustrated completely assembled on one illustration and a separate breakdown and exploded view of this sub-assembly furnished. Such sub-assemblies shall be assigned an item number when illustrated completely assembled.

Some illustrations may require the inclusion of certain parts not listed to show the relation of parts to the assemblies listed. When drawing a system or sub-system diagram, the parts, units or assemblies which do not fall in that system or sub-system shall not be item numbered on that illustration. These parts shall be toned down or shown in phantom to give emphasis to assemblies or parts listed and the drawing number may be shown.

When a unit, assembly or part used on a later model differs from a unit, assembly or part used on the basic model, and the change is such that the illustration of the unit, assembly or part used on the basic model will not adequately portray the new unit, assembly or part, it shall be illustrated wherever practicable on the illustration for the basic model. If space does not permit the employment of this method of illustration, a separate complete illustration and breakdown shall be furnished showing the new unit, assembly or part and shall be placed immediately following the illustration and breakdown for the unit, assembly or part of the basic model.

Item numbers with leaders (and an arrow where necessary to clearly indicate the detail concerned) to the parts to which they pertain shall be used on all illustrations. Item numbers shall be applied only to those parts listed.

An item number and part number shall be assigned to each assembly that is sold as an assembly to the operator. If it is impractical to include a separate illustration, the sub-assemblies that make up the assembly shall at least be bracketed on the illustration.

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Illustrations shall be assigned figure titles. The figure title and the corresponding major assembly or sub-assembly nomenclature shall be identified.

To the maximum extent practicable, all illustrations shall be located on left-hand pages and the relative listings, if confined to one page, on the facing right-hand page. If there is more than one page of listings, the first page shall be the facing right-hand page, with other pages following in proper sequence. In no event shall the parts list precede its illustrations.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

AUTOMATED PRESENTATION

1. General Information

This section establishes the requirements for supplying the Detailed Parts List portion of the Illustrated Parts Catalog in punched card format. No provision is made in this system to supply other sections of the catalog or any aspects of illustration pages in punched card format.

Marginal information such as pagination, dates, chapter/subject/unit shall be programmed by the printer of the catalog.

Provisions are made to transmit this data to the operator from the manufacturer and from the operator to the manufacturer. The transmission of cards shall always be covered by a transmittal letter.

A. Card Specifications

All cards used by the operator and the manufacturer (supplier) must conform to the specifications for size, thickness, material and condition necessary to guarantee uninterrupted use in electric accounting or electronic data processing equipment.

The printing and registration of all formats on cards must be accomplished to prevent interference in mechanical operations.

Black ink shall be used to imprint all cards and must be of legible and permanent quality.

Operator or manufacturer emblems and printing must not interfere with the use of the area covered. Shadow or phantom printing is preferable.

Cards shall be neutral in color. The corner cut shall be upper right.

B. Interpreting Punched Data

The punched data in all cards transmitted by mail from the operator or manufacturer shall be manually written or mechanically interpreted prior to transmission. Where wire transmission systems are employed, pre-interpretation by the sender is not required.

C. Use of Special Characters

Due to the limitations of certain tabulating machines in the true interpretation of special characters, this system permits the use of the eleven punch only for any special character and shall be interpreted in the true interpretation of the particular equipment even though the character is to be considered as a dash (-). The only exception to this rule is that the "plus" shall be punched and interpreted as "P". The "plus or minus" shall be punched and interpreted as "PM". The "minus" shall be punched and interpreted as "M".

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D. Card Punching

The part number appearing in the Part Number field shall be consistent with the part number appearing in the Part Number column of the published Illustrated Parts Catalog furnished to the operator, except as provided below:

- (1) Any alpha "O" appearing in part numbers shall be punched and interpreted as a numeric zero.
- (2) Blank spaces or special characters separating alpha characters or alpha characters from numeric characters shall be eliminated and closed up when punched.
- (3) Blank spaces or special characters separating numeric characters shall be punched and interpreted as special characters (Ref. paragraph C).
- (4) Part Number fields shall be punched and interpreted from left to right, with the first character of the part number appearing in the leading column. Only the characters of the part number shall be punched and interpreted. The succeeding positions of the field shall be left blank.

E. Leading Zeros in Quantitative Fields

Punched zeros shall precede significant characters in Quantitative Fields. Such leading zeros may be suppressed in interpretation.

The following fields are quantitative:

Unit or Assembly
Figure Number
Item Number
Effectivity
Units per Assembly

F. Trailer Cards

Use of trailer cards shall be limited to the Effectivity and Nomenclature (Airline Part No.) fields and shall use the same card layout. (Ref. Fig. 2 of this section.)

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2. Card Format and Field Definitions

Punched cards shall be prepared in the field format shown in Figure 2 of this section. These fields are defined as follows:

FIELD NOS.	FIELD TITLE	TYPE OF CHARACTER	DESCRIPTION
1 thru 3	Transaction Code	Alpha/Numeric	Column 1 is alpha and identifies the card as a Catalog card and indicates the particular transaction. (Ref. Fig. 1.)
			Column 2 is numeric/alpha and identifies the card sequence of a multiple card set pertaining to one part number. The first card of the set shall start with number 1 (Ref. Fig. 1.)
			Column 3 is numeric/alpha and identifies the revision number of the card. It also identifies the last card of the set pertaining to a particular part number. Original transactions (issues) shall be coded "one (1)" except for the last card which shall be coded "J". Revisions to a previously issued part number shall be coded 2 thru 9 except for the last card of the set which shall be coded with the equivalent alpha code. (Ref. Fig. 1.)
4 thru 8	Supplier (Manufacturer)	Numeric	This field identifies the manufacturer who produces the catalog data. Use a five digit numeric code (U.S. Federal Supply Code when one is assigned).
9 thru 11	Customer	Alpha/Numeric	Columns 9 and 10 are alpha and identify the Airline IATA code.

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FIELD NOS	FIELD TITLE	TYPE OF CHARACTER	DESCRIPTION
12	Category Control	Numeric	<p>Column 11 is numeric and identifies the Airline office to which the card is to be transmitted. Always applied.</p> <p>This field identifies the category of parts - illustrated or not illustrated. Always applied</p> <ul style="list-style-type: none"> - . Not illustrated 1. Illustrated 2. Attaching parts 3. Standard parts 4. Numerical Index entry only indicates - Superseded by (part number appearing in nomenclature blocks 54-80). 5. Numerical Index entry only indicates - Cancelled. 6. Numerical Index entry only indicates - See (part number appearing in nomenclature blocks 54-80). 7. Numerical Index entry only indicates - Same as (part number appearing in nomenclature blocks 54-80.) <p><u>NOTE:</u> Use alpha codes K and L for numeric codes 2 and 3 to show not-illustrated condition.</p>
13	Equipment Type	Alpha	This field identifies the type of aircraft or engine catalog. Codes for this field shall be supplied to the manufacturer by the operator.

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FIELD NOS.	FIELD TITLE	TYPE OF CHARACTER	DESCRIPTION
14	Indenture	Numeric	This field identifies the indentation required to show item relationship to the next higher assembly. (Ref. 2-4-2 of this specification.)
15-16	Aircraft System	Numeric	This field identifies the chapter numbers within the 1st element number as defined in 1-3-1 of this specification. Always applied.
17	Sub-system	Numeric	This field identifies the sub-system or section within the 2nd element number as defined in 1-3-1 of this specification. Always applied.
18	Sub-sub-system	Numeric	This field identifies those sub-sub-systems within the 2nd digit of the 2nd element number when the complexity of the sub-system requires a further breakout as defined in 1-3-1 of this specification. Use zero when no breakout is required. Always applied.
19-20	Unit or Assembly	Numeric	This field identifies the individual units or assemblies within the 3rd element number. Always applied.
21 thru 23	Figure Number	Alpha/Numeric	Columns 21 and 22 are numeric and identify illustration figure numbers within the Chapter/Sub or Sub-Sub-System/Unit or Assembly breakouts. Always applied.
			Column 23 is alpha and identifies variants within a fleet which require additional figure numbers to be fitted between those previously issued. These variants occur

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FIELD NOS.	FIELD TITLE	TYPE OF CHARACTER	DESCRIPTION
			as a result of such things as modifications, unit interchangeability, etc. When no variant exists leave this column blank.
24 thru 27	Item Number	Alpha/Numeric	Columns 24, 25 and 26 are numeric and identify each part numbered item. Always applied.
			Column 27 is alpha and identifies variants within a fleet which require additional parts to be fitted between those previously issued. These variants occur as a result of such things as material changes, substitutions, modifications, etc. When no variant exists leave this column blank.
28	Reserved		This field, although reserved for operator use to permit insertion of additional lines between existing lines, may be used by the manufacturer, provided the data is not punched on the cards furnished to the operator.
29 thru 43	Part No.	Alpha/Numeric	This field identifies the manufacturer's part number. It shall be justified left for the maximum of 15 digits. Always applied.
44 thru 45	Reserved		This field, although reserved for the operator, may be used by the manufacturer provided the data is not punched on the cards furnished to the operator.
46 thru 51	Effectivity	Alpha/Numeric	This field identifies the specific equipment to which the part is applicable. Leave blank if part is applicable to "ALL". (Ref. 2-4-2 of this specification.)

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FIELD NOS.	FIELD TITLE	TYPE OF CHARACTER	DESCRIPTION
52-53	Units per Assembly	Alpha/Numeric	This field identifies the quantity of the particular part in the unit or assembly. (Ref. 2-4-2 of this specification.)
54 thru 80	Nomenclature/ Airline Part No.	Alpha/Numeric	This is a dual purpose field. On cards punched with a transaction code A, B, C or D in column one it describes the part or assembly and related data. (Ref. 2-4-2 of this specification.)
			On cards punched with a transaction code E, F, G or H in column one, columns 54 thru 64 identify the Airline part number. It shall be justified left for the maximum of eleven digits.

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<u>Column 1</u> <u>TYPE</u> Alpha only	<u>Column 2</u> <u>CARD NUMBER</u> Numeric/Alpha	<u>Column 3</u> <u>REVISION NUMBER</u> Numeric/Alpha
<u>Manufacturer Originated</u>	<u>Catalog detail card</u>	<u>When used with Code A or E, use:</u>
A - New Item	1 Additional Nomenclature cards added to original Part Number	For all cards except last card: For last card of set: 1 J
B - Delete Item		
C - Alteration to previously transmitted item	9	
D - Not assigned	A	
<u>Operator Originated</u>	Z	<u>When used with Codes B, C, F or G, use:</u>
E - New Item		For all cards except last card: For last card of set: 2 1st revision K
F - Delete Item		3 2nd revision L
G - Alteration to previously transmitted item		4 3rd revision M
H - Not assigned		5 etc. N 6 O 7 P 8 Q 9 R and Repeat to 2 or K

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Illustrated Parts Catalog Transaction Code Chart
Figure 1

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Catalog Card - ATA SPEC. 100 FORM 100-1 (Single and Double Line Interpretation)

TRANS	SUPPLIER	CUST	CATALOG SEQUENCE	PART NUMBER	RES	EFFECTIVITY	UNITS PER ASSEMBLY	NOMENCLATURE																																																							
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Catalog Card - ATA SPEC. 100 FORM 100-1A (Double Line Interpretation)

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ATA SPEC. 100 FORM 100-1A (JAN 3/67)																																																															

Illustrated Parts Catalog Card Format

Figure 2

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Overhaul Manual

POLICY

Manufacturers shall prepare separate and self-supporting overhaul instructions for each repairable unit which they manufacture. They shall also prepare overhaul instructions for units not normally considered repairable or 'overhaulable', but which may require such work to be done on them as shop testing and special inspections to establish their ability to perform satisfactorily when returned to service, or which may be more economical to repair than to discard.

Overhaul instructions shall contain descriptive information and specific procedures and data pertaining to work done on units and assemblies with the units and assemblies removed from the aircraft. They are prepared for the mechanic who normally performs shop work and not for the aircraft service mechanic. Conversely, maintenance instructions contained in the Maintenance Manual are prepared for the mechanic who normally performs work on units, assemblies and systems while they are installed in the aircraft and not for the shop mechanic.

It is permissible to combine overhaul instructions for several units or assemblies which are basically the same, provided that the resulting instructions are clear and leave no doubt in the mind of the reader as to the applicability of the information to the unit on which he is working. Use of Difference Data Sheets is not acceptable. The combining of overhaul instructions for several dissimilar units or assemblies under one cover and then supplying one Illustrated Parts List for the combination is also not acceptable. Under no circumstances shall aircraft or engine effectiveness be shown on either the title page or text of overhaul instructions.

Overhaul instructions shall be divided into the functional headings shown in 2-5-1 of this specification.

Modern concepts for obtaining the maximum utilization and serviceability of units and assemblies dictate the need for certain parts to be exchanged or work or inspections to be performed which will permit their return to service for their next operating period. Such concepts require procedures for partial disassembly and assembly, specific inspections and tests which are different from the complete disassembly and assembly procedure. These go as directly as possible to a specific area without disturbing other areas.

Inclusion of time limits and scheduled inspections or checks in overhaul instructions is specifically prohibited unless required by government regulation. Airlines desire the manufacturer's recommendations for same, but they should be provided in a separate document.

Overhaul instructions shall describe all the operations that could be performed during an overhaul. They shall not, however, imply or in any way define the content of an overhaul for a unit or assembly.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

The airframe manufacturer's Overhaul Manual shall include data on units or assemblies which are proprietary with that airframe manufacturer and, in addition, shall provide system tab dividers in accordance with Section 1-3-2 of this specification, for material supplied by engine and accessory manufacturers.

The engine and accessory system manufacturers shall provide data in accordance with this specification for all units included in their systems. In the case of individual units within these systems manufactured by other suppliers, it will be satisfactory for the engine or accessory system manufacturer to refer to the overhaul instructions published by the manufacturer of that unit. Engine and accessory system manufacturers who elect to supply such data by reference shall provide in their instructions a list of all referenced units, showing original manufacturer part number, publication number, company name and address. If a multiple assembly, such as a valve and motor-actuator, is separable and can be so obtained, separate overhaul instructions shall be prepared for each - one for the valve and one for the motor-actuator.

Overhaul instructions of component or accessory manufacturers shall be supplied in accordance with this specification prior to the initial delivery of the equipment to the operator.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

APPLICATION OF STANDARDS

1. Format and Illustration Standards

Except as specified herein, all provisions of Chapter 1 of this specification apply to overhaul instructions. In addition, the provisions of Sections 2-2, Wiring Diagram Manual, and 2-4, Illustrated Parts Catalog, shall be followed where applicable. In particular, the specifications for material to be supplied as outlined in 2-2-0, the requirements of 2-2-1 paragraph 1, and the standard symbols specified in 2-2-2 shall be followed. If the manufacturer's original working master as mentioned in Section 2-2-0 is larger than 36 inches in length, then the reproducible master shall be supplied in 11 x 16 inch size.

The manufacturer's masthead on every page shall include the basic part number of the unit or assembly. Where instructions also cover variations of the basic part number, these part number variations shall be shown on the title page. Procedures peculiar to the variants shall be clearly identified within the text of the instructions or in the Illustrated Parts List as the case may be.

2. Application of Standard Numbering System

The three-element numbering system as described in Section 1-3-1 of this specification shall be used (First element - chapter, second - section, third - unit or item). The chapter and section numbers shall conform with those shown in Section 1-2-1 except in the case of multiple use units. Special provisions for these units are described below. The third element shall be assigned by the manufacturer preparing the overhaul instructions and shall consist of one or two digits. No two overhaul instructions produced by the same manufacturer shall bear the same three element number. Manufacturer's part number shall not be used.

When units can be used in more than one sub-system of a system "-09" is assigned as the second element number, with the third element "X" assigned by the manufacturer.

Example: 21-09-X
 31-09-X

Overhaul instructions on "multiple system-use assemblies" (i.e., those units which are useable in more than one system such as electrical motors, actuators, relays, connectors, hydraulic actuators, pumps, etc.) shall be prepared to follow all standards of this specification except that the information shall be categorized under Chapter - Section Number 24-09-X if source of power is Electrical; 29-09-X if Hydraulic; 36-09-X if Pneumatic; or similar applicable number such as 31-09-X Instruments, for general purpose gauges.

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Material included in each of the sub-headings listed in 2-5-2 shall normally start on a new right-hand page. If several divergent skills are required to accomplish the work, it is desirable that procedures covering these several skills be written on separate pages. In case of small and simple units, with the exception of Illustrated Parts Lists, which shall always be provided on a separate page, it is permissible to combine several sub-headings of data on one page. In the case of large and complicated units (overhaul instructions of more than 25 pages) separate page number blocks shall be assigned to each sub-heading in addition to starting on a new right-hand page. Where this is done, page number blocks to be used are as follows:

1-100	Description and Operation
101-200	Disassembly
201-300	Cleaning
301-400	Inspection/Check
401-500	Repair
501-600	Assembly*
601-700	Fits and Clearances
701-800	Testing
801-900	Trouble Shooting
901-1000	Storage Instructions
1001-1100	Special Tools, Fixtures and Equipment
1101-1200	Illustrated Parts List (applicable when parts list combined with overhaul instructions)
1301 & up	Light Overhaul
1 & up	Illustrated Parts Catalog (applicable when separate Illustrated Parts Catalog provided)

* - In the engine Overhaul Manual, the sub-heading "Assembly" shall be tab-divided into separate breakdowns and re-named "Sub-Assembly" and "Final Assembly."

Except as noted in the preceding paragraph, the page numbers shall start with page 1 for each unit/subject assigned under the third element number. The page number sequence shall continue consecutively to the end of the item.

Information covering major units or assemblies shall be sectioned in a logical sequence of sub-assemblies to permit its use for assembly line procedure used in large shops.

3. Special Requirements for Engine Overhaul Manual

In addition to the other requirements of this section, the engine manufacturer shall:

A. Provide plasticized index tab markers for Chapter 72, reading:

Description and Operation, Disassembly, Cleaning, etc., using the headings called out in paragraph 2 above.

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- B. Identify and collate the contents of this manual so that all Description and Operation, Disassembly, Cleaning, etc., contents fall behind the proper tab marker.
- C. Identify the contents so that the titles of the sub-headings (Disassembly, Cleaning, Sub-Assembly, etc.) shall appear and be located in the lower outside corner of each page, just above the Chapter/Section number.

Example: SUB-ASSEMBLY
72-31-01
Page 501
Date

- D. Number the contents of the manual in accordance with Section 1-3 of this specification.

To illustrate further, in each heading:

Procedures applying to the engine as a whole shall be written under Chapter number 72 followed by 00-00 (General).

Procedures which are performed alike on similar units or components of the engine shall be covered under Chapter/Section number 72-09-X, with the third element "X" assigned by the manufacturer.

Example: Cleaning of common bearings would be shown as:

CLEANING
72-09-X
Page 201
Date

Procedures which apply to specific sub-assemblies or units shall be covered under their respective second or third element number.

Example: Repairs applying to a component would be shown as:

REPAIR
72-31-01
Page 401
Date

4. Special Requirements for Electrical/Electronic Overhaul Instructions

In addition to the other requirements of this section, the manufacturer of electrical/electronic equipment shall provide a system of coding wiring diagrams in conformance with the following requirements that will enable an operator to maintain positive configuration control of a unit in its various stages of modification during its service life.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

A. Physical Requirements

- (1) Diagrams shall be provided in multiple sheets (2 or more) with sheet 1 being a Revision Reference Sheet. Sheet 1 shall be limited to 8-1/2" x 11" sheet size. Subsequent sheets shall contain the diagrams and shall be limited in sheet size to that specified in Chapter 1 of this specification.
- (2) Changes to diagrams shall be identified by an arrow head containing the change number (Ref. Figs. 2 and 3).

B. Required Coverage

- (1) The Revision Reference Sheet (Ref. Fig. 1.) shall contain historical descriptive data concerning each significant change and the serial numbers of the affected units. It shall also reference applicable Service Bulletin numbers.
- (2) Changes that are effective on all serial numbers shall not be coded on the diagram as the purpose of the coding system is to allow a single diagram to show the unit in progressive configurations.
- (3) Extensive changes made to a diagram as a result of a single modification which cannot feasibly be identified by use of the code designator system shall require the preparation of an additional diagram. The additional diagram shall reflect the first unit serial number on which the change is effective.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURER'S MASTHEAD

MANUAL TITLE

BASIC PART NUMBER

REVISION CODE	REVISION DESCRIPTION	SERIAL NO. EFFECTIVITY
1	Changed A2CR2 from type 601C to HD6616; changed A2CS4 from 2200 pf to 0.047 uf; and added A4C10, 1000 pf between V1; pin 5 and ground to improve on-course characteristics at high signal levels. Covered by Service Bulletin No. 34-6.	No. 1773 through 1825; 2066 through 2095; 2276 through 2975; and 3096 and above.
2	Changed A4R17 from 1000 to 10K ohms; removed A4R22, .82 ohms; changed A4R15 from 470 to 220 ohms; changed A4R18 and A4R20 from 1470 to 681 ohms to increase deviation load capability from three to five 1000-ohm loads and to increase the flag alarm load capability from two to four 1000-ohm loads. Covered by Service Bulletin N6. 34-19.	No. 2458 through 2475; 2610 through 2675; 2820 through 2875; 2957 through 2975; and 3076 and above.
3	The resistance of R19 was changed from 1000 to 500 ohms to provide for smoother, more precise deviation sensitivity and balance adjustments. This modification is covered by Service Bulletin No. 34-15 and applies only to units modified according to Service Bulletin No. 34-8.	No. 2458 through 2475, 2610 through 2675, 2820 through 2875, 2957 through 2975, and 3076 and above.
4	Added C11, 100 pf, from V1, pin 1 to ground to prevent vhf parasitic oscillations in the second audio amplifier which could cause a small deviation error. Covered by Service Bulletin No. 34-17.	AF modules A4, MCN 5142, 5147, 5149 and above.

XYZ Glide Slope Receiver
Revision Reference Sheet
Figure 1 (Sheet 1 of 3)

34-31-21
Page 801
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Sample Page - Revision Reference Sheet
Figure 1

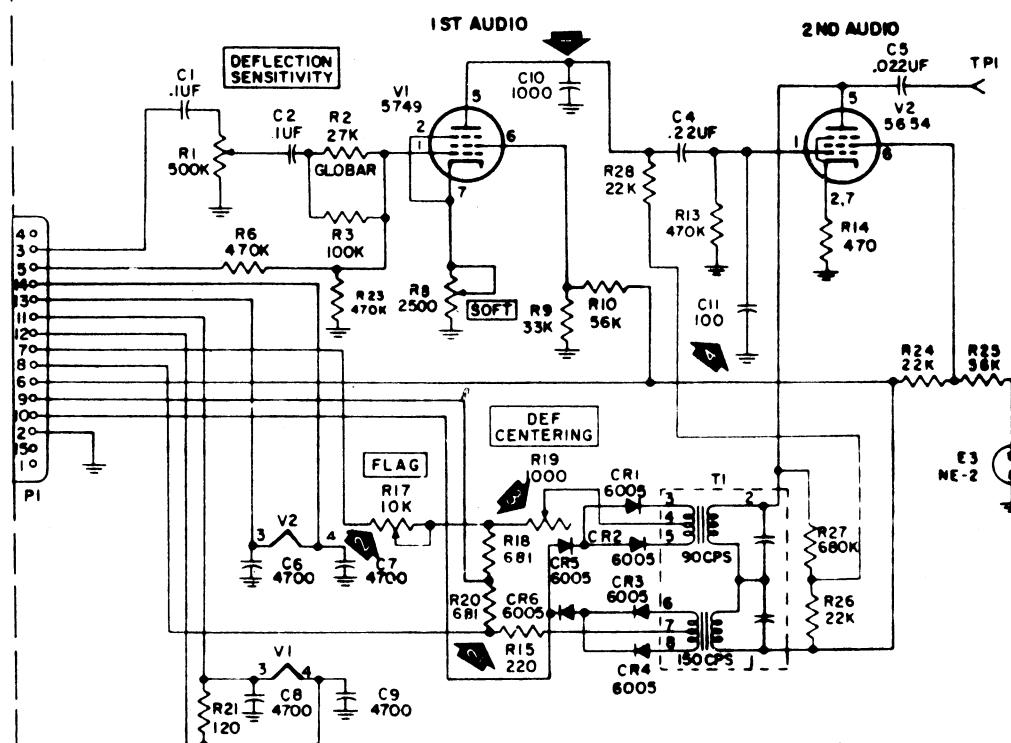
2-5-1
Page 5
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

MANUFACTURER'S MASTHEAD

MANUAL TITLE

BASIC PART NUMBER



XYZ Glide Slope Receiver - A4AF Module
 Figure 1 (Sheet 2 of 3)

34-31-21

Page 803
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Sample Page - Coded Wiring Diagram
 Figure 2

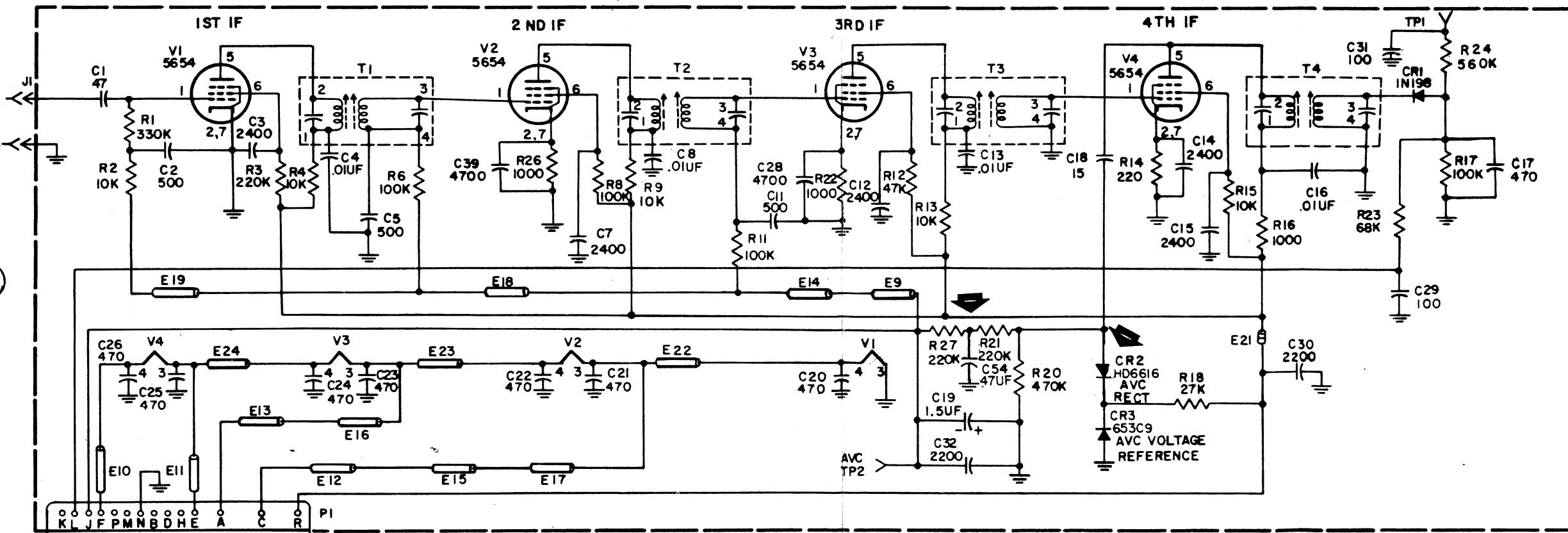
2-5-1

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MANUFACTURERS MASTHEAD

MANUAL TITLE

BASIC PART NUMBER

XYZ Glide Slope Receiver - A2 IF Module
Figure 1 (Sheet 3 of 3)34-31-21
Page 805
Dec 15/65Sample Page - Coded Wiring Diagram
Figure 32-5-1
Page 7
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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

PRESENTATION

1. Manual Content

The material for each unit covered shall be divided into the following sub-headings as applicable. Where no information under a certain sub-heading is required, such as in the case of a non-repairable unit for which only inspection and testing instructions are logical, it may be omitted. Applicable sub-headings shall tell how to do all of the work items which could and may be required to be done to the unit or assembly during its lifetime in operation. Cross references between sub-headings shall refer to the sub-heading title, for example: "See Testing".

A. Description and Operation

This sub-heading shall contain an illustrated detailed description and operation of the unit and briefly describe its operation and function in the aircraft or power plant. In the case of electrical and electronic equipment, this sub-heading shall include detailed circuitry and a comprehensive explanation of the operation of the unit. Simplified schematics shall be used liberally as an aid in the understanding of the unit's operation. Tables of leading particulars shall be indented to provide ready reference to the characteristics and capabilities of the unit.

B. Disassembly

Cover disassembly in a step-by-step procedure, taking into consideration that the unit will be disassembled in an overhaul shop. Disassemble only as far as practicable - often complete disassembly is neither required nor desired. Do not call for the breaking of welded joints or unsoldering of connections, etc., where no useful purpose could be gained by such action (for example, unsoldering joints and removing all wiring from the chassis of a piece of electronic equipment). Reference figure numbers on exploded views, indicate cautions when parts might be damaged, and warnings when personnel might be injured by improper disassembly. State when disassembly is not required for some portion of the unit. Indicate all parts that must be kept in matched sets. List shim and spacer locations for reference during assembly. Identify parts which are recommended for discard. Do not state test or inspection procedures in this sub-heading except as required for locating discrepancies that could not readily be found after disassembly or cleaning. The practice of saying such as "Disassemble in the order indicated by the parts list item numbers" is not acceptable.

C. Cleaning

List detailed cleaning procedures and methods. Specify all approved cleaning agents in a separate grouping for ready reference and ease of revision.

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D. Inspection/Check

This sub-heading shall contain the detailed inspection procedures required to accomplish complete overhaul. Reference only shall be made to fits and clearance charts for applicable wear tolerances.

Inspection procedures shall be written in a step-by-step method, whenever practicable. Specify methods, techniques, and inspection equipment required whether it be visual, magnifying glass, dye penetrant, magnetic, or other. Procedures shall include for each particular part all necessary data, presented in graphic form where possible, including critical stress areas where defects or cracks are most likely to be detected, nature and maximum allowable extent of defects, recommended magnetization process and current values for the part concerned in the case of magnetic inspection. Reference to a testing standard of a general nature is not acceptable.

Instructions regarding the degree to which inspections and checks should be done shall be specific. Use of broad adjectives such as close, thorough, excessive, heavy, etc., is not acceptable.

E. Repair

This sub-heading shall include repairs required to return a unit to service after wear or damage has occurred. This shall include items such as rebushing, grinding and plating, welding and refinishing. Plating, machining and refinishing specifications shall be shown where applicable, including material heat treat, shot peening, baking, etc.

Detailed repair procedures shall be prepared for all areas normally subject to wear or damage such as seal areas, bearing and friction surfaces, static joints subject to corrosion, etc. They shall also be prepared for any part which is considered to be more economical to repair than discard. Illustrations shall be provided showing dimensions, fits, clearances, etc., to which the repaired part must be reworked. Specific areas requiring such work as shot peening, heat treat, plating, etc., shall be indicated on the illustration.

F. Assembly

A step-by-step assembly procedure shall be provided. The practice of saying "Assembly is opposite of disassembly" is NOT satisfactory. When parts are mentioned, refer to item number on exploded view. If there are sub-assemblies, list these first, and then final assembly. Reference only shall be made to fits and clearance charts for assembly fits and clearance tolerances and for assembly torque values. Materials such as approved lubricants, sealants, electrical wire, special lockwire, etc., used during assembly shall be grouped in this sub-section for ready reference and ease of revision. Reference should be made in the text to this grouping. Special lockwire requirements shall be given. List parts to be installed as matched sets.

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Calibration or tests required during assembly, either due to inability to accomplish after final assembly or more practical to accomplish during assembly, shall be included in this section. If the calibration or test is required to be repeated after final assembly, the procedure shall be located in the Testing Section and this section shall reference the appropriate paragraph.

Steps which are not to be accomplished until after testing shall be clearly indicated - example: "To facilitate testing do not lockwire nut (4)." Likewise, steps which are not to be accomplished until after unit installation on the aircraft shall also be clearly indicated; example: "To facilitate installation on the aircraft do not adjust or lock screw (6)."

G. Fits and Clearances

List all fits and clearances used in assembly, including, where applicable, permissible wear tolerances and assembly torque values. State the circumstances to which the various wear tolerances apply, taking into consideration that a unit in airline usage should be maintained to tolerances which will allow it to serve out its next intended life in operation. In the case of the more complex units and assemblies, listings shall be provided in table or chart form for ready reference and ease of revision.

H. Testing

Testing procedures shall be provided using the production methods of testing as opposed to those used by the manufacturer for unit specification approval.

Equipment and set-up. State equipment required, materials used, required input temperatures, pressures, voltages, etc. Give set-up procedures.

Test procedures and adjustments. Give detail step-by-step procedure for testing and adjusting. Show testing of sub-assemblies, if required, separate from the testing of the unit as a whole.

In addition to normally prepared test procedures, Electronic Test Specifications for all complex electromechanical units, which accept electrical/pneumatic inputs and have electrical outputs shall be written in Abbreviated Test Language for Avionics Systems (ATLAS), ARINC Equipment Characteristic No. 416.

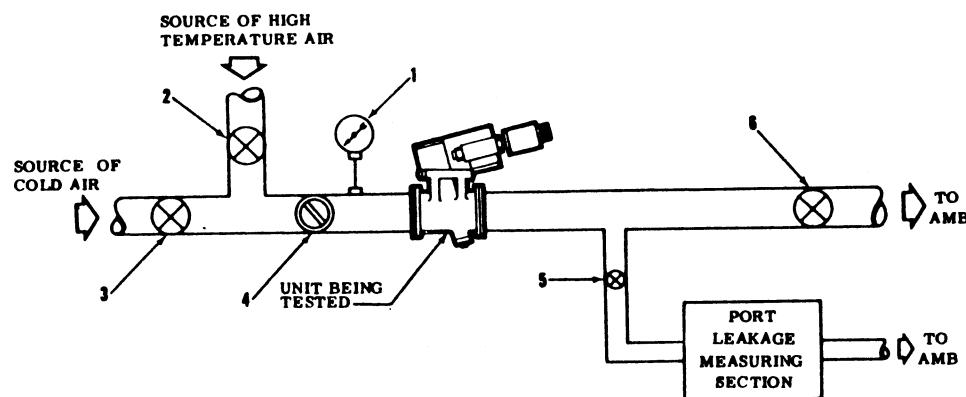
Test specifications. Provide tables of limits, taking into consideration the fact that a unit in airline usage should be maintained to tolerances which will allow it to serve out its next intended life in operation. The input - be it voltage, current signals of a certain frequency and level, hydraulic or air pressure and flow, horsepower and RPM - shall be stated. The output in brake horsepower, RPM, volts, amperes, watts, or given travel of the device shall be stated. Illustrations of normal wave or pulse forms shall be included for all test points. If the device has a temperature rate-rise limit or leakage limits they shall be shown. Fluid/air leakage limits shall be given for the minimum length of time necessary to determine a satisfactory or no-leak condition.

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MANUFACTURER'S MASTHEAD

MANUAL TITLE

BASIC PART NUMBER



Legend

1. Gage - Inlet air pressure
2. Valve - Upstream hot air shutoff
3. Valve - Upstream cold air shutoff
4. Regulator - Inlet air pressure
5. Valve - Port leakage shutoff
6. Valve - Throttling

Test Set Up
Figure 701

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Sample Page - Typical Test Set Up
Figure 1

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Test procedures shall be prepared in such a way that units can be tested using vendor equipment. In addition, test parameter requirements shall be fully specified so that the operator may select and use alternate test equipment.

When test procedures reference vendor test equipment valve positions, switch positions or test lamp operations, test equipment schematics shall be provided as an integral part of the procedures.

A block diagram showing the test set-up shall be provided. (Ref. Fig.1).

I. Trouble Shooting

Charts shall be provided in accordance with Section 2-1-2, keeping in mind that the trouble shooting will be done with the unit removed from the aircraft. Trouble shooting performed with the unit in the aircraft shall be contained in the Aircraft Maintenance Manual.

Complete detailed schematic and wiring diagrams shall be included in this sub-heading.

J. Storage Instructions

This sub-heading shall cover special handling, packaging, storage and preservation requirements associated with a packaged or un-packaged unit.

Where the supplier ships the unit in a long-life (ATA Specification 300 Category I) reusable container as his standard pack or upon order from the customer, instructions relating to the maintenance and repair of the container shall be provided as an attachment to overhaul instructions.

Storage conditions such as humidity and temperature control shall be stated. Preservation requirements and procedures shall be shown. Specify preservatives and solvents in a separate grouping in this sub-section for ready reference and ease of revision. Reference shall be made in the text to this grouping.

K. Special Tools, Fixtures and Equipment

This sub-heading provides for the listing of special tools, fixtures and equipment needed by a mechanic to perform the work listed in other sub-sections. When a separate tool and equipment list, as shown in 2-6 of this specification is provided, the listing in the overhaul instructions need not be illustrated.

Special recommended environmental or physical conditions under which work should be performed shall be stated in this section.

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L. Illustrated Parts List

This sub-heading shall follow the standards and format outlined under Detailed Parts List 2-4-2 of this specification. A numerical index shall supplement the Detailed Parts List whenever the latter exceeds five pages. Each parts list shall carry a decoding table, listing the vendor names and codes for all internal parts other than those of the manufacturer preparing the list. (Exception - In the case of simple units, where only two or three vendor items are listed, it will be permissible to list vendor codes or names and addresses in the nomenclature column immediately following the part being listed.) A table showing Wiring Diagram Symbol designators referenced to part numbers shall be provided. Where the Illustrated Parts List would exceed one hundred pages a separate Illustrated Parts Catalog shall be prepared.

When exploded views are impractical, as in circuit boards, the illustration shall be a plane or perspective view (orthographic). The practice of using wiring diagrams for parts list illustration is not acceptable. The practice of using a Provisioning Parts List in lieu of an Illustrated Parts List is also not acceptable.

Electronic parts such as resistors and capacitors shall contain an electrical description of their ratings in the nomenclature column.

When an assembly or part used on a later model differs from an assembly or part used on the basic model, and the change is such that the illustration of the assembly or part used on the basic model will not adequately portray the new assembly or part, it shall be illustrated wherever practicable on the illustration for the basic model. If space does not permit the employment of this method of illustration, a separate complete illustration and breakdown shall be furnished showing the new assembly or part.

Items in the nomenclature column shall be indented or coded to indicate their relationship as follows:

1 2 3 4 5 6 7
Assembly
 Attaching parts for assembly

 Detail parts for assembly
 Sub-assembly
 Attaching parts for sub-assembly

 Detail parts for sub-assembly
 Sub-sub-assembly
 Attaching parts for sub-sub-assembly

 Detailed parts for sub-sub-assembly

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M. Light Overhaul

(1) Engine Overhaul Manuals

This sub-heading shall provide special procedures primarily for the disassembly and assembly of engine sections to accomplish part-life exchange or minor repair of the various components of the engine. To a lesser degree it shall also provide other procedures covering functions such as Repair, Testing, Trouble Shooting, etc., as are required to do the job. Procedures which are identical with normal overhaul procedures shall not be included here but shall be cross-referenced to those sections.

(2) Component Overhaul Manuals

This sub-heading shall provide those procedures designed to accomplish only certain work necessary to guarantee satisfactory performance until the next recommended overhaul. Special tests and inspection shall be listed which are required (1) to examine units on an interim service life schedule, and (2) to determine the exact condition of a unit which has been prematurely removed from service because of malfunction, and the work required to qualify it for continued service without complete teardown and rebuild. Procedures which will permit the disassembly and assembly of certain sections of the unit without disturbing other sections shall also be provided where applicable. Procedures, tests and inspections which are identical with complete overhaul procedures shall not be included here but shall be cross-referenced to those sections.

N. Effectivity - Overhaul Manual - Page Number Block 1101-1200 Illustrated Parts List or 1 and Up Illustrated Parts Catalog

The concept of parts effectivity as noted below for an overhaul manual is different from that found on 2-4-2, pages 11 and 12 for an aircraft or engine Illustrated Parts Catalog. In the Illustrated Parts Catalog (Ref. 2-4-2) the objective is to either establish the parts relationship to one or more aircraft or in the case of an engine Illustrated Parts Catalog to establish its parts interchangeability.

In the overhaul manual it is more important to establish parts relationship with a group of units or assemblies which are essentially the same but have minor variations. These units or assemblies are usually the lead items on the Detailed Parts List.

These units or assemblies shall be assigned reference letters such as A, B, C, D, etc. Parts which are not common to all configurations but are associated with one or more of the coded lead items, shall carry the letter or letters assigned to the lead item with which it is associated.

Parts which are or can be used on one or more of the units or assemblies but not on all, shall have the letter or letters assigned to the effectivity column, opposite the lead item with which they are associated.

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Tool and Equipment Lists

POLICY

These shall be illustrated listings of all special tools and equipment required for line maintenance, overhaul and service of the equipment as recommended by the aircraft, aircraft component or aircraft accessory manufacturer. These lists shall not include those pieces of standard test equipment required in the shop for unit overhaul and should be confined to the equipment and its component parts or installed systems as a whole.

Separate lists shall be used to recommend shop equipment and special test stands provided by the aircraft, engine and accessory manufacturers for bench testing of their equipment. It is recommended that where a standard composite bench is available, and is satisfactory to the manufacturers, it be specified.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

Service Bulletins

POLICY

The Service Bulletin shall be the only document used to notify the airlines of the types of recommendations outlined under "Required Coverage" of this Section. This requirement is specified because of the importance of these recommendations and the necessity for assuring proper handling within the receiving airline.

Even though there are many other media of publications and correspondence available to the airframe, engine and accessory manufacturer, they shall not be used to transmit the information covered in this Section.

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TYPES OF SERVICE BULLETINS

1. Campaign Wire

Matters of extreme urgency shall be transmitted by telegraph, cable or in some cases by telephone. These shall be identified as "Alert Bulletins" and shall contain a Service Bulletin number. An "Alert Service Bulletin" shall be prepared and mailed promptly to confirm and elaborate upon all such messages.

2. "Alert" Service Bulletin

Alert Service Bulletins shall be issued on all matters requiring the urgent attention of the operator and shall generally be limited to items affecting safety. Alert Service Bulletins shall be prepared on LIGHT BLUE colored Service Bulletin forms with the word "ALERT" in the heading and the sequence number shall be preceded by an "A" to assist in distinguishing them from routine Service Bulletins. Alert Service Bulletins shall generally have a letter type format and shall contain all information necessary to accomplish the required action. In cases where more information is needed on the same subject, the Alert Bulletin shall be followed up by a standard Service Bulletin identified by the same number and shall include a statement that it revises the "Alert". In this way, advance information and Standard Service Bulletin information will be filed together for future reference.

3. Service Bulletin (Standard)

Standard Service Bulletins shall be issued where the use of Campaign Wires and/or "Alert" Service Bulletins are not required.

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REQUIRED COVERAGE

1. Issuance

Separate Service Bulletins shall be issued to cover each subject and shall describe changes which fall into the following categories:

- A. Modifications to the aircraft, engine or accessory.
 - (1) Modifications which affect performance, improve reliability, increase safety of operation, provide improved economy or facilitate maintenance or operation.
- B. Substitution of one part with another superseding part only when it is not completely interchangeable both functionally and physically or when the change is considered to be sufficiently urgent or critical that special scheduling or record of accomplishment will be required.
- C. Special inspections/checks required to maintain the aircraft, engine or accessory in safe operating condition.
 - (1) One-time inspections/checks to detect a flaw or manufacturing error.
 - (2) Special inspections/checks required to be performed until a corrective action can be taken. For example, an inspection to detect cracks in a radius until the radius can be ground out. The modification information shall be issued as a revision to the same Service Bulletin which transmits the inspection instructions.
 - (3) Special functional checks of an urgent nature required to detect an incipient failure, such as pressure checks, functional checks, etc.

2. Standard Procedures

Service Bulletins must not be used to cover routine recommended inspection/checks, standard repairs or revisions to maintenance practices or overhaul procedures. These shall be covered as revisions to the manufacturer's maintenance, structural repair or overhaul manual as appropriate. (Ref.1-4-0).

Separate Bulletins shall be issued to cover each subject.



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APPLICATION OF STANDARDS

1. Format and Illustration Standards

All provisions of Chapter 1 of this specification apply to the Service Bulletin except as specified in A, B, C and D below:

- A. No binder is required.
- B. Paper shall be white for standard Service Bulletin; light blue for the "Alert" Service Bulletin.
- C. In lieu of a formal type of illustration, an informal sketch type of presentation may be made in Service Bulletin illustrations provided clarity is not sacrificed.
- D. The issuance and revision service standards in Sections 1-4-0, 1-4-1 and 1-4-2 are superseded by the provisions in paragraph 4 following.

Standard symbols as shown in Section 2-2-2 of this specification shall be used in wiring diagrams and schematics.

2. Specification for Material to be Supplied

The manufacturer shall supply copies of each Service Bulletin as follows:
(a) one translucent copy printed on one side of the page only and, (b) additional copies printed in accordance with Chapter 1 of this specification.

When a Service Bulletin makes reference to a manufacturer's drawing or wiring diagram which is necessary in compliance with the Bulletin, a reproducible copy of this drawing or applicable portion thereof shall be included or attached to the Service Bulletin.

Periodically the manufacturer shall issue an Index of all Service Bulletins released to that date. Revisions shall be issued no less frequently than quarterly. Greater frequency is particularly desirable, especially during the introduction of a new fleet into service.

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3. Application of Standard Numbering System

Each page shall bear a chapter-issue sequence number rather than a "chapter-section" number. Page number shall be placed immediately beneath the chapter-issue number. Each bulletin page shall be numbered starting with page 1. In addition, the first page of the Service Bulletin shall state the total number of pages included in the complete Service Bulletin.

NOTE: These requirements do not prohibit the manufacturer from using his own numbering system in addition to the above. The latter number, if used, shall be inconspicuous.

4. Revision Service

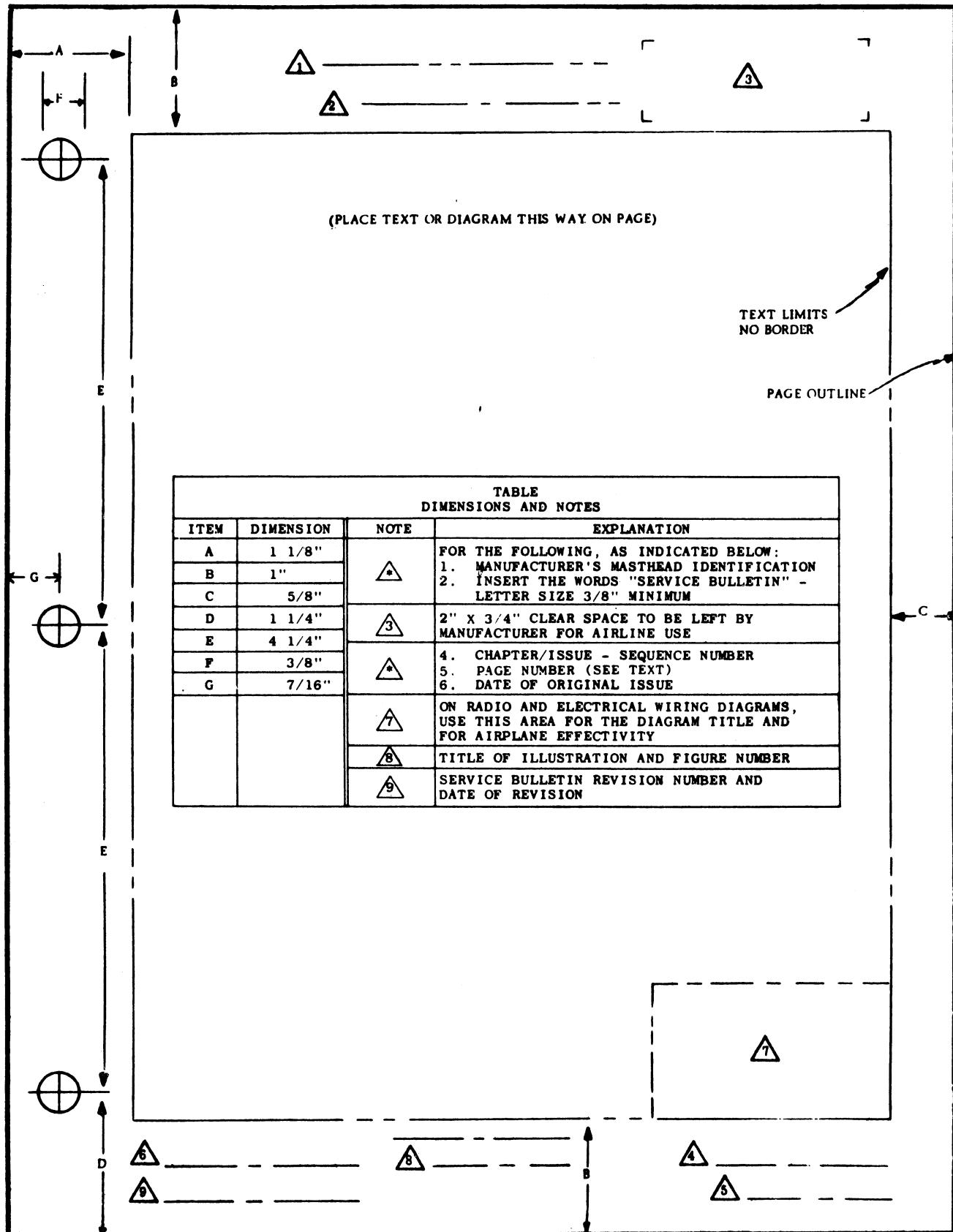
Revision service shall be provided and the following adhered to:

- A. Revision to a Service Bulletin, or part thereof, shall be made by re-issuance of the page or pages involved.
- B. Each revision shall be accompanied by a transmittal sheet which shall transmit a numbered revision. For example: "This page transmits Revision 2 to Service Bulletin 21-15." Page 1 and each revised page shall contain the latest revision number, the original date of issue and the date of the latest revision (Ref. Fig. 1).

The transmittal shall contain a comprehensive summary of the reason for the revision. It also shall list the dates and numbers of all previous revisions and/or reissues.

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Sample Service Bulletin Page - Vertical Layout
Figure 1

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PRESENTATION

Service Bulletins shall contain a title located immediately below the manufacturer's masthead and Service Bulletin heading. It shall contain the chapter name as shown in this specification, key word, and a brief statement of the work involved. This information shall be in the sequence stated, such as "Air Conditioning - Out-Flow Valve - Install New Relay In Differential Control."

The body of the Service Bulletin shall be prepared in three sections: Planning Information, Accomplishment Instructions, and Material Information. Each section shall begin on a new right-hand page and the page numbers shall be continuous through all sections. Where the Bulletin is so simple that it can be presented on one sheet (front and back), the sections shall be separated on the page by title headings.

1. Planning Information

This section shall contain the information required to permit the operator to determine if the Bulletin should be applied to his equipment and to plan its accomplishment. This data shall be presented under the following headings:

A. Effectivity

Specify the equipment to which the Service Bulletin is applicable. A Bulletin number shall apply to one model only. For aircraft, list model and factory serial numbers, for units, list model, part numbers and serial numbers, or otherwise clearly identify equipment affected.

B. Reason

State why the Bulletin is being issued; i.e., improve reliability, increase payload, the advantages and expected results and the effect on maintenance and operation of aircraft, engine or unit, etc. Long treatises should be avoided. However, sufficient facts, such as total time, time since overhaul, etc., shall be made available to assist the operator in making a decision.

C. Description

Provide a brief but complete statement outlining what the Service Bulletin does.

D. Compliance

Provide a statement "recommended" if manufacturer feels strongly that the Bulletin should be accomplished; otherwise, state "optional based on operator's experience."

In lieu of the above and where legal considerations require more lengthy statements, one of the following may be used:

- (1) (Issuer) considers that the work outlined herein affects the safety of the aircraft.
- (2) Although the work outlined herein does not affect the immediate safety of the aircraft, (issuer) recommends its accomplishment.
- (3) (Issuer) considers the work outlined herein desirable but not urgent.

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E. Approval

When governmental approval of a change is required, approval shall be obtained prior to release of the service bulletin and so stated in the service bulletin.

F. Manpower

Provide an estimate of the manhours required by the operators to perform the service bulletin. It must be broken into the steps that were followed in making the estimate.

In cases where the service bulletin may be accomplished in independent portions, the estimated manhours required shall be detailed separately for each portion.

State assumed status of aircraft or unit in making estimate; e.g., at overhaul, in service, etc. If compliance with previous service bulletin is assumed so indicate.

Provide an estimate of the elapsed time in hours to accomplish the service bulletin.

G. Material - Cost and Availability

Provide a complete list of parts kits available and the list price, price break quantity, and delivery information for kits. If kits are not provided and items are to be purchased separately, estimate the total parts cost and provide delivery information on major items.

This section shall also contain information on any credits which may be involved such as credit for return of a superseded part or assembly.

Also state the warranty period on new parts and/or accessories where it exceeds standard warranty periods.

H. Tooling - Price and Availability

When special equipment, such as tools, jigs, fixtures, or test equipment are required to accomplish the modification and is available, the estimated price and delivery schedule (and the manufacturer if other than the issuer of the service bulletin) shall be provided. Where required tooling is to be manufactured by the operator to a vendor design, the necessary data shall be supplied either within the service bulletin or as reproducible drawings.

I. Weight and Balance

Weight and balance data shall be furnished in accordance with the following:

- (1) Aircraft: For an aircraft modification, the net total change in weight shall be stated if it equals or exceeds ± 0.1 pound.

The associated center of gravity arm or moment for the modification shall be stated.

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- (2) Engine: For a new engine, the weight and center of gravity arm for the complete engine shall be stated. The engine manufacturer's stationing system shall be used.

For an engine modification, the net total change in weight shall be stated if it equals or exceeds ± 0.1 pound.

The associated center of gravity arm for the modification, in terms of engine manufacturer's stationing system, shall be stated.

- (3) Accessory or Component for Aircraft Use: For a new item, the weight shall be stated.

For an item modification, the net total change in weight shall be stated if it equals or exceeds ± 0.1 pound.

Center of gravity arm or moment is not required.

Modifications for which weight and balance data is excluded under the above tolerance requirements shall show the term "None" under this heading. The word "Negligible" or any equivalent shall not be used.

To ensure compliance with the above requirements, it will frequently be necessary to evaluate the cumulative or total weight and balance effect of a seemingly minor change. Such data as is thereby generated shall be given under this heading, even though it may be within the tolerance. The tolerances represent a maximum acceptable omission and do not preclude the usefulness of lesser data.

The decimal system shall be used. Quote weights in pounds and tenths, arms in inches and tenths, and moments in inch-pounds rounded to the nearest unit. Prefix all data with plus (+) or minus (-) signs as applicable.

If any useable fluid is involved as part of a modification, it shall be suitably identified and the weight and moment data stated separately. Closed-system or unuseable fluids, such as hydraulic fluid or unuseable oil shall be included in the net total change, identified and the quantity or weight stated.

In cases where the bulletin is or may be separated into phases, so that only part of the bulletin may be accomplished, weight and arm or moment data shall be provided for each phase.

J. References

State source of information used in preparation of the Service Bulletin such as other service bulletins, drawings, government regulatory body directives, maintenance manuals, overhaul manuals, parts catalogs, etc. When applicable, state if Service Bulletin has to be accomplished in conjunction with, prior to, or subsequent to accomplishment of other Service Bulletins or portions thereof.

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K. Other Publications Affected

List the chapter/section locations within affected manuals and catalogs which will require revision as a consequence of the Service Bulletin.

When Service Bulletins effect changes in aircraft operational procedures, the airframe manufacturer shall, where applicable, coordinate issuance of revisions to the government-approved Airplane Flight Manual.

2. Accomplishment Instructions

This section shall contain step-by-step instructions for accomplishing the work.

- A. Consistent with the status of the aircraft, engine or unit assumed in the preparation of the manpower estimate, list all operations required to accomplish the change, referencing current maintenance and overhaul manuals where possible. Steps shall be numbered and in sequence for ease of reference. These instructions should include drawings both "before" and "after" modification, wiring diagrams and schematics, where necessary. Such drawings and diagrams should be located as close to the written material which they depict as possible. Drawings should include as much of the surrounding area or structure as is necessary to clearly identify the part and should show the area as it would be viewed by the mechanic.
- B. In the case of complex Service Bulletins where the instructions might be divided into bench and aircraft categories, it is desirable that these two portions be separated, each starting on a right-hand page. This may at times cause duplication of instructions common to both groups.
- C. Instructions shall be provided for reidentifying the modified part and ready differentiation between the parts.
- D. In the event modification or rework changes the operational or test procedure of the component or system, such procedure shall be clearly defined.
- E. The second person imperative shall be used for operational procedures. For example: "Break casing bead loose from wheel flange"...avoid sentences in the passive voice. The third person shall be used for description and discussion. For example: "The torsion link assembly transmits torsional loads from the axle to the shock strut."

3. Material Information

This section shall include:

- A. A statement identifying the basis upon which material data are provided; i.e., per aircraft, per engine or per next higher assembly.

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B. A listing in tabular form covering the complete bill of materials required to accomplish the Service Bulletin on a unit.

The table shall show, by kit, the unit quantities, unit list price (if available), part numbers and keyword, supersedure and any required instructions for handling or disposition of the material. Special tools necessary shall be listed along with the kit materials.

Presentation of the necessary information shall conform to the following:

New P/N	Quantity	Unit	List Price	Key Word	Old P/N	Disposition	Instructions -
1	2	3	4	5	6		

Information to be shown in each column is as follows:

Col. 1 Part number of new or reworked part.

Col. 2 Quantity of new parts required, including unit of measure (foot, doz., etc.).

Col. 3 Firm or estimated (designate which) list price per unit, if available. If the change is on a "no charge" basis, indicate accordingly.

Col. 4 Name of part, indicating left- or right-hand identification if required.

Col. 5 Part number of superseded part, whether discarded or reworked.

Col. 6 Indicate any special handling of all new or superseded parts. Examples of types of information to be shown are:

1. If the manufacturer's part is the same as a military or other specification, show the specification number.

2. Indicate whether the old and new part are physically interchangeable. Information on supersedures is required back to the last Service Bulletin.

3. If there is a difference in quantity between old and new parts, show quantity.

4. If the old part is interchangeable with a new part by reworking, indicate the drawing number.

5. Refer to another manufacturer for special additional information.

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6. Indicate whether or not part is to be purchased from another source or fabricated by the customer.
7. Indicate whether a part may be renumbered and used on different items or aircraft and if part number changes, give new part number.
8. If material is not offered in kit form and is not an "on shelf" item, then specify delivery from date of receipt of firm order.
9. Indicate when a part can not be reworked to its ultimate and is therefore no longer suitable for any application.

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Weight and Balance Manual

POLICY

The Weight and Balance Manual shall be the manufacturer's means of transmitting weight and balance data to an airline. This manual shall contain data in sufficient detail so that the airline Weight Engineer or other personnel concerned may analyze and establish weight and balance procedures for airline operation. The manual shall contain all the weight and balance material required by government regulations for a commercial aircraft and sufficient supplementary information to allow personnel concerned to intelligently perform the duties of their position.

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APPLICATION OF STANDARDS

1. Format and Illustration Standards

All physical requirements shall be as specified in 1-1-0 through 1-1-3, except for the following deviations.

- A. A rigid type binder with inscription on the backbone need not be furnished.
- B. Two tabs shall be furnished titled "Control" and "Aircraft Reports."
- C. Where required by government regulations the manufacturer's pagination shall be printed in the page binding margin.
- D. Pages in the "Aircraft Report" chapter of the weight and balance manual need not be printed on both sides.

2. Arrangement of Material

Policy for arrangement of material shall be as specified in 1-2-0; however, the assignment of subject matter specified in 1-2-1 shall be replaced entirely by 2-8-2.

3. Application of Standard Numbering System

The numbering system used shall be as specified in 1-3-0 through 1-3-2, except substitute 2-8-2 where reference to 1-2-1 is made.

4. Issuance and Revision Service

The manual shall be issued and revised as specified in 1-4-0 through 1-4-2, except for the following deviations.

- A. Revision service for the "Control" chapter of the weight and balance manual need not be maintained after one year following delivery of the last aircraft to which this chapter is assigned.
- B. Revision service for the "Aircraft Report" chapter of the weight and balance manual need not be maintained for delivered aircraft to which this chapter is assigned, except for predelivery corrections.

5. Nomenclature

- A. Units of weight and measure shall be clearly defined, consistent, and correspond to those appearing on the aircraft to which the weight and balance manual is assigned.
- B. The terms listed in 1-5-0 shall be supplemented by the weight and balance terms in 2-8-3.

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ASSIGNMENT OF SUBJECT MATTER

Weight and balance manual data shall be presented in the order and under the chapters, sections and titles noted herein. If the chapters or certain sections are put in separate binders, an introductory page shall be inserted in each.

<u>CHAP</u>	<u>SECT</u>	<u>TITLE</u>	<u>SUBJECT MATTER</u>
1	CONTROL	All weight and balance data specifically related to a group of aircraft	
-00	GENERAL	Make, model, serial, and registration identification of all aircraft to which this chapter of the weight and balance manual is assigned	
		Diagram of the aircraft general exterior and principal dimensions'	
		Location of zero reference datum and relationship of balance arm to other assigned stations	
		Location of mean aerodynamic chord or location of alternate reference; statement of related formula	
		Engineering drawing number(s) or equivalent for all station location systems which will be suitable for scaling	
		Definitions of all nonstandard terms used in the weight and balance manual	
		Maximum design weight limits and related restrictions	
		Maximum design center-of-gravity limits and related restrictions	
		Takeoff trim setting	
		Balance effect on aircraft caused by operation of aircraft components or closed systems	
-20	FUEL	Diagram of fuel tank arrangement and identification of each tank	
		Fuel limits and related restrictions for normal operations	
		Recommended fuel management for loading and usage	
		Volume, weight, and balance arm of usable fuel for each tank, or tank set, in incremental and "full" conditions; statement of difference between alternate standard fueling methods.	

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<u>CHAP</u>	<u>SECT</u>	<u>TITLE</u>	<u>SUBJECT MATTER</u>
			Volume, weight, and balance arm of trapped portion of usable fuel
			Volume, weight, and balance arm of drainable and trapped portions of unusable fuel
			Volume, weight, and balance arm of sump fuel
-30	FLUIDS		Volume, weight, and balance arm of engine oil for each system and tank in "drained and full" condition
			Volume, weight, and balance arm of hydraulic system fluid in "full" condition
			Volume, weight, and balance arm of engine injection fluids in incremental and "full" conditions
			Volume, weight, and balance arm of miscellaneous system fluids when they have a weight and (or) balance effect on aircraft; statement of system condition(s)
-40	PERSONNEL		Diagram of crew arrangement, each certificated passenger arrangement, and associated partitions
			Standard weight and balance arm for each crew member in upright seated position; statement of seat location
			Standard weight and balance arm for each passenger in upright seated position
			Balance effect on aircraft of crew and passenger movement and seating pattern
			Volume of lined but unfurnished passenger compartments; cross-sectional areas at terminal and transition sections
-60	CARGO		Diagram of cargo (and baggage) compartments and associated partitions
			Floor loading limits and related restrictions for normal operations
			Volume, maximum weight, and recommended nominal balance arm(s) of cargo compartments; cross-sectional areas at terminal and transition sections
			Table of package sizes that will pass through door openings intended for cargo loadings; table of door opening dimensions

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<u>CHAP</u>	<u>SECT</u>	<u>TITLE</u>	<u>SUBJECT MATTER</u>
			Cargo retention limits and related restrictions for normal operations
			Aircraft cargo handling system limits for normal operations
-80	GROUND OPERATIONS		Diagram of jacking locations
			Maximum static loads for each jacking location and related restrictions
			Recommended procedure for preparing and weighing aircraft; list of weighing equipment required
			Estimated weight and balance arm of principal aircraft sections and components
			Volume and lateral arm of principal system fluids for each tank in incremental and "full" conditions
			Balance limits for normal ground loading operations
-90	EXAMPLES		Buildup from manufacturer's empty weight and balance to operational empty weight and balance representative of aircraft to which this chapter of the weight and balance manual is assigned
			Weight and center-of-gravity diagram showing weight and balance limits, location of operational empty weight and balance buildup, and vectors for useful load
			Loading calculations for a typical aircraft departure; statement of allowances used
			Examples considered necessary to clarify the use of data contained in the "Control" chapter of the weight and balance manual.

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<u>CHAP</u>	<u>SECT</u>	<u>TITLE</u>	<u>SUBJECT MATTER</u>
2		AIRCRAFT REPORT(S)	All weight and balance data specifically related to one aircraft
-*		AIRCRAFT REPORT	Make, model, serial, and registration identification of aircraft to which this section of the weight and balance manual is assigned; weighing date on all appropriate pages
			Diagram identifying aircraft divisions used in breakdown of equipment list
			Record of aircraft certification weighing and all subsequent adjustments up to time of delivery
			Delivery departure weight and balance manifest
			List of equipment and fluids to unquestionably define the aircraft configuration; positive identification and cross-reference to standard break down in 1-2-1; weight and balance arm of each item
			Aircraft configuration clearly defined using a check (✓) for each listed item in aircraft and a zero (0) for each listed item not in aircraft

* The section element assigned to each aircraft report shall be the applicable aircraft registration identification without punctuation or spacing.

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

DEFINITIONS

To avoid the confusion arising from varying interpretations of terms, specific definitions have been established for the weight and balance conditions most generally encountered.

ACTUAL ZERO FUEL WEIGHT
(AZFW)

Operational empty weight plus payload. (It must not exceed maximum design zero fuel weight).

BASIC EMPTY WEIGHT
(BEW)

Standard basic empty weight plus or minus weight of standard item variations.

DELIVERY EMPTY WEIGHT
(DEW)

Manufacturer's empty weight, less any shortages, plus those standard items and operational items in aircraft at time of delivery. (Last-minute additions or deletions may be listed on the weight and balance manifest).

DRAINABLE UNUSABLE FUEL

Unusable fuel minus unusable portion of trapped fuel.

ESTIMATED NORMAL PAYLOAD
(ENP)

Total weight of passengers, cargo, and baggage selection by the operator for statistical and related purposes. (It is based on certificated passenger arrangements, standard passenger weights, cargo and baggage densities experienced by the operator, and cargo compartment limits. It must not exceed maximum payload or weight limited payload).

FLEET EMPTY WEIGHT
(FEW)

Average basic empty weight used for a fleet or group of aircraft of the same model and configuration. (The weight of any fleet member shall not vary more than the tolerance established by governmental regulations).

GUARANTEED WEIGHT

Weight the manufacturer clearly defines and guarantees subject to contractual tolerances and adjustments.

MANUFACTURER'S EMPTY WEIGHT
(MEW)

Weight of structure, powerplant, furnishings, systems, and other items of equipment that are an integral part of a particular aircraft configuration. (It is essentially a "dry" weight, including only those fluids contained in closed system).

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MAXIMUM DESIGN FLIGHT WEIGHT (MFW)	Maximum weight for flight as limited by aircraft strength and airworthiness requirements. (Flaps-up condition is implied unless otherwise stated).
MAXIMUM DESIGN FUEL TRANSFER WEIGHT (MFTW)	Maximum weight at which fuel transfer may be initiated between tanks without causing a critical structural condition.
MAXIMUM DESIGN LANDING WEIGHT (MLW)	Maximum weight for landing as limited by aircraft strength and airworthiness requirements.
MAXIMUM DESIGN TAKEOFF WEIGHT (MTOW)	Maximum weight for takeoff as limited by aircraft strength and airworthiness requirements. (This is the maximum weight at start of takeoff run).
MAXIMUM DESIGN TAXI WEIGHT (MTW)	Maximum weight for ground maneuver as limited by aircraft strength and airworthiness requirements. (It includes weight of taxi and runup fuel).
MAXIMUM DESIGN ZERO FUEL WEIGHT (MZFW)	Maximum weight allowed before usable fuel and other specified usable agents must be loaded in defined sections of the aircraft as limited by strength and airworthiness requirements.
MAXIMUM PAYLOAD	Maximum design zero fuel weight minus operational empty weight.
OPERATIONAL EMPTY WEIGHT (OEW)	Basic empty weight or fleet empty weight plus operational items.
OPERATIONAL ITEMS	Personnel, equipment, and supplies necessary for a particular operation but not included in basic empty weight. (These items may vary for a particular aircraft and may include, but are not limited to, the following: <ol style="list-style-type: none">1. Crew and baggage2. Manuals and navigational equipment3. Removable service equipment for cabin, galley, and bar4. Food and beverages, including liquor5. Usable fluids other than those in useful load

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6. Life rafts, life vests, and emergency transmitters

7. Aircraft cargo handling system and cargo container).

OPERATIONAL LANDING WEIGHT
(OLW)

Maximum authorized weight for landing. (It is subject to airport, operational, and related restrictions. It must not exceed maximum design landing weight).

OPERATIONAL TAKEOFF WEIGHT
(OTOW)

Maximum authorized weight for takeoff. (It is subject to airport, operational, and related restrictions. This is the weight at start of takeoff run and must not exceed maximum design takeoff weight).

PAYOUT
(P/L)

Weight of passengers, cargo, and baggage. (These may be revenue and (or) nonrevenue).

SPACE LIMITED PAYLOAD
(SLP)

Payload as restricted by seating, volumetric, and other related limits of the cabin, cargo, and baggage compartments. (It must not exceed maximum payload).

STANDARD BASIC EMPTY WEIGHT
(SBEW)

Manufacturer's empty weight plus standard items.

STANDARD ITEMS

Equipment and fluids not an integral part of a particular aircraft and not a variation for the same type of aircraft. (These items may include, but are not limited to, the following:

1. Unusable fuel and other unusable fluids
2. Engine oil
3. Toilet fluid and chemical
4. Fire extinguishers, pyrotechnics, emergency oxygen equipment
5. Structure in galley, buffet, and bar
6. Supplementary electronic equipment).

STANDARD ITEM VARIATIONS
(SIV)

Standard items that the operator adds, deducts, or changes

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TRAPPED FUEL	Fuel remaining when aircraft is defueled by normal means using the procedures and attitudes specified for draining the tanks.
UNUSABLE FUEL	Fuel remaining after a fuel runout test has been completed in accordance with governmental regulations. (It includes drainable unusable fuel plus unusable portion of trapped fuel).
USABLE ENGINE INJECTION FLUID	Fluid, other than fuel, available for aircraft propulsion.
USABLE FUEL	Fuel available for aircraft propulsion.
USEFUL LOAD	Difference between operational takeoff weight and operational empty weight. (It includes payload, usable fuel, and other usable fluids not included as operational items).
WEIGHT LIMITED PAYLOAD (WLP)	Payload as restricted by the most critical of the following: <ol style="list-style-type: none">1. Operational takeoff weight minus operational empty weight minus minimum usable fuel2. Operational landing weight minus operational empty weight minus flight reserve fuel3. Compartment and other related limits (It must not exceed maximum payload).

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SPECIFICATION FOR MANUFACTURERS' TECHNICAL DATA

NONDESTRUCTIVE TESTING MANUAL

POLICY

The airframe manufacturers' Nondestructive Testing Manual shall contain descriptive information and specific instructions and data pertaining to the nondestructive testing of the primary and secondary structure.

It also shall include data on units and assemblies which are proprietary with that airframe manufacturer.

The engine and accessory system manufacturers shall provide data in accordance with this specification for all units adaptable to nondestructive testing.

Trade names shall not be used in specifying a particular procedure or method.

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APPLICATION OF STANDARDS

1. Format and Illustration Standards

All provisions of Chapter 1 of this specification shall apply to the Non-destructive Testing Manual, except as noted herein.

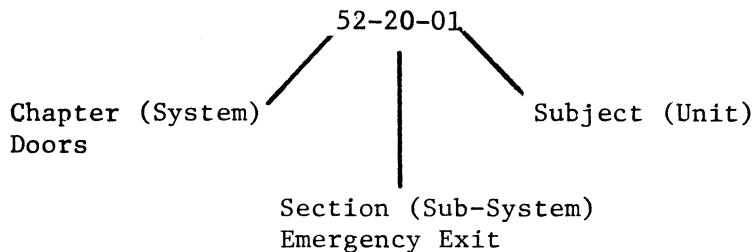
2. Method of Designation

The methods of testing, as described below, shall be indicated at the top of each page directly under the masthead. Each Part (method) shall stand with its own series of Chapters, Sections and numerical Subjects.

Type Aircraft, Engine and/or Accessory
Component Nondestructive Testing Manual
Part 1 - General
or
Part 2 - X-Ray
Part 3 - Gamma Ray
Part 4 - Ultra-Sonic
Part 5 - Resonance Frequency
Part 6 - Eddy Current

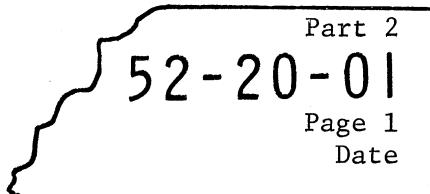
3. Application of Numbering System

A three element numbering system, as described below, shall be used in the Nondestructive Testing Manual for each Part (method) as listed in paragraph 2. above.



Each breakout shall begin with page 1.

The following example illustrates a typical Nondestructive Testing Manual page numbering. Note that Part, Chapter, Section, Subject, Page number and Date are all covered.

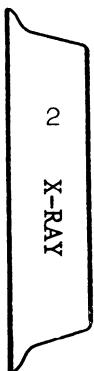


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4. Indexing

Each Part shall be identified individually by a tab divider carrying the title. Typical example follows:



Each Part shall open with a list of effective pages and a table of contents.

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METHOD OF PRESENTATION

1. Text Material

A. Text Content

Text shall be as brief and concise as practicable. Instructions shall be covered adequately by tabular data that shall be presented so that conversion to equivalent equipment may be determined.

2. Illustrations

Illustrations shall be adequate to depict the procedure. Illustrations of the airframe structure shall be provided to show locations by stations identifying materials of construction. Wherever possible orthographic illustrations showing uncovered areas to be tested shall be included (Ref. Fig. 1). Illustrations of typical examples of fatigue test specimen failure shall be included where necessary (Ref. 1-1-3, Para. 2).

3. Manual Content

Unless covered in Part 1 (General), the following types of information shall be located in the Part applicable to the method of testing:

Specific testing procedures
Sheet metal types, materials, thicknesses, density
Extrusion types, materials
Acoustic properties of materials

NOTE: Locations of materials that would interfere with normal and nondestructive testing shall be listed (Lead impregnated sound proofing, etc.)

Whenever possible each area shall be presented separately.

Each procedure shall define the equipment projection angle required for that procedure to obtain maximum results, such as planes of reference, axis, normal plane of defect, etc.

The system used to determine the angle required for inspection shall be defined.

Charts shall be used wherever possible to minimize text.

A complete history of problem areas or areas where disassembly is undesirable because of time or expense required shall be maintained.

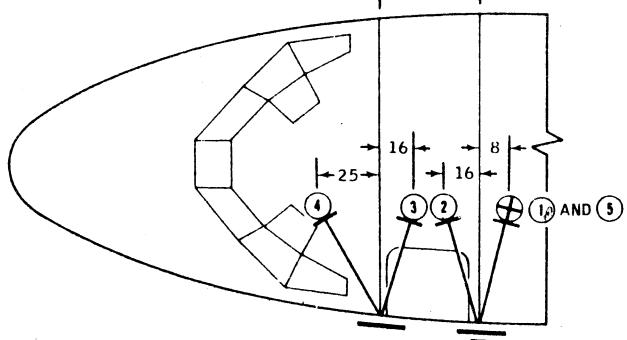
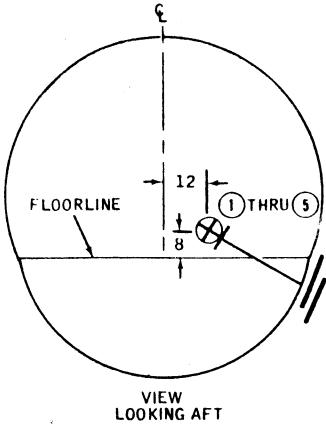
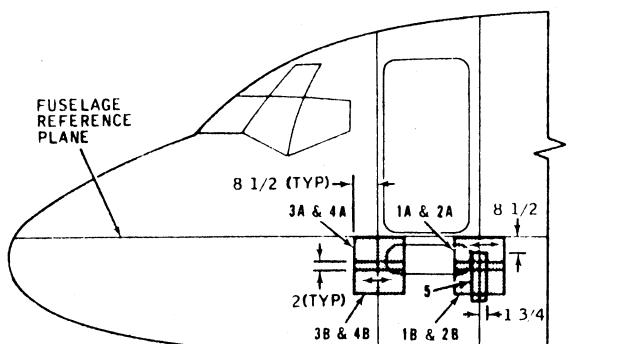
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MANUFACTURER'S MASTHEAD

MANUAL TITLE

PART 2 X-RAY



NOTES:

1. THE PASSENGER ENTRANCE FORWARD STAIRWAY MUST BE RETRACTED TO ACCOMPLISH EXPOSURES 1 THRU 4
2. THE PILOTS SEAT MUST BE REMOVED TO ACCOMPLISH EXPOSURE 4.

EXPOSURE	SUBJECT	KV	MAS	SFD (IN.)	FILM	SIZE
1A B	JAMB-AFT AREA	130	900	54	II & III	14 x 17
2A B		130	900	54	II & III	14 x 17
3A B	JAMB-FORWARD AREA	130	900	54	II & III	14 x 17
4A B		130	1200	54	II & III	14 x 17
5	FRAME - STA 200	130	900	54	II & III	14 x 17

RADIOGRAPHIC DATA

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Stairwell Door Jamb Area
Figure 5

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SAMPLE PAGE - ORTHOGRAPHIC PRESENTATION
Figure 1

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